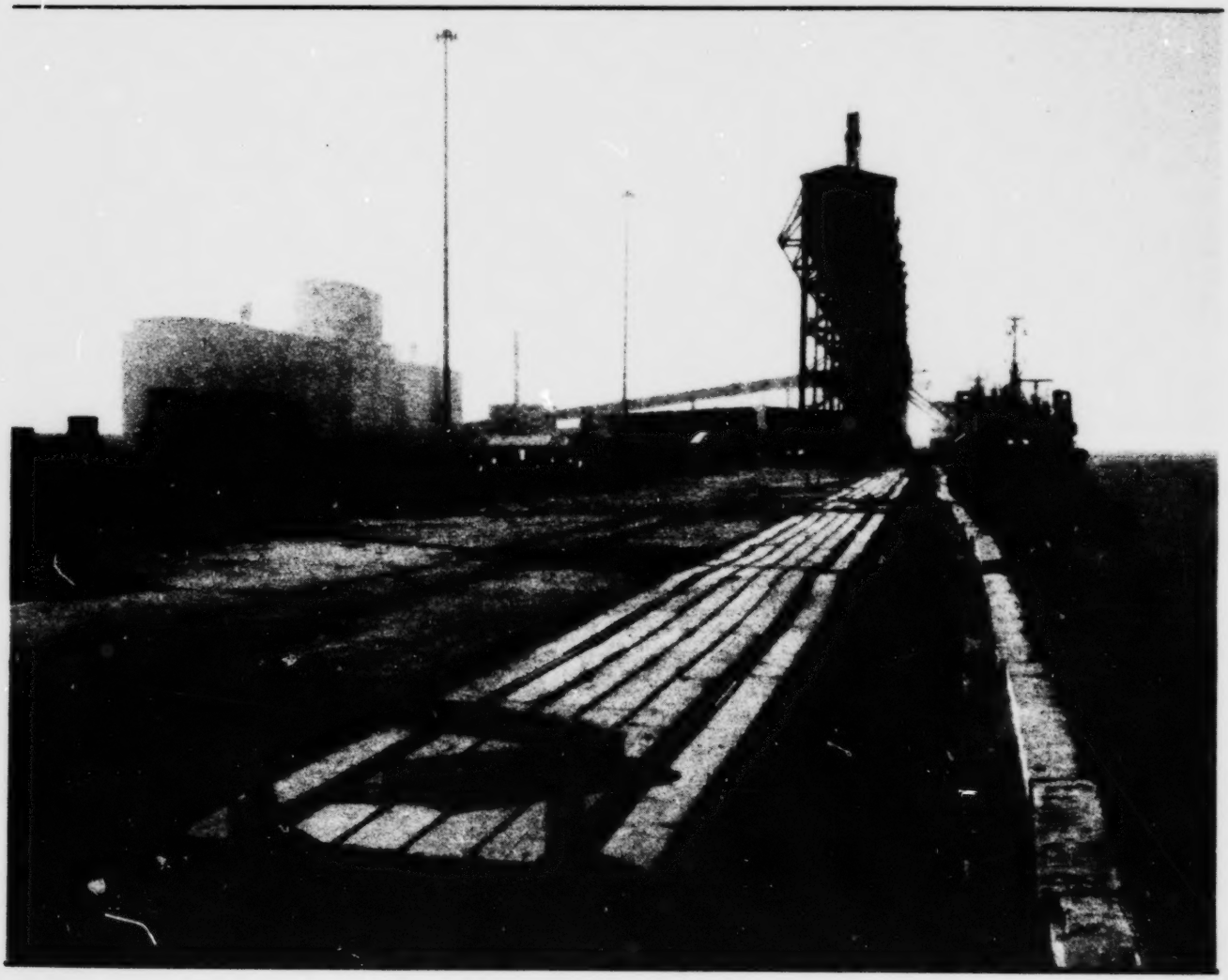
GOVERNMENT OF CANADA
Transport Canada

GOVERNMENT OF MANITOBA
Highways and Transportation

# PORT OF CHURCHILL
# SUMMARY REPORT



MARCH 1986

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# PORT OF CHURCHILL

# SUMMARY REPORT

Prepared for

GOVERNMENT OF CANADA
TRANSPORT CANADA

GOVERNMENT OF MANITOBA
HIGHWAYS AND TRANSPORTATION

by

IBI GROUP

in association with

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Stevenson Hluchan & Associates Ltd.
Carr & Donald & Associates
Canadian Offshore Data Analysis
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March, 1986

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Gentlemen:

Port of Churchill Summary Report

INTRODUCTION

This study was conducted on behalf of the Government of Canada, Transport Canada and the Government of Manitoba, Department of Highways and Transportation, under the Canada-Manitoba Subsidiary Agreement on Churchill. The study was conducted on an integrated basis by IBI Group and its associated consultants, with the following four components:

- Study A: Season Extension;
- Study B: Additional Commodities;
- Study C: Resupply Operations;
- Study D: Grain Shipping Costs.

The detailed results of the study are presented in four separate volumes, one for each of the above studies, each of which is over one hundred pages in length and includes an Executive Summary.

To assist those wishing to obtain an overview of the study, this Summary report presents the Executive Summary sections of each of the four component reports. Owing to the overwhelming importance of grain shipments through the Port, followed by its use as a transshipment point and base for Arctic resupply operations, the results of the four studies are presented in reverse order starting with Grain Shipping Costs,

followed by Resupply Operations and then dealing with Additional Commodities and Seasonal Extension in the context of the study findings regarding grain shipping and resupply operations.

The objectives and scope of each of the four component studies are summarized at the beginning of each chapter. Reference is made in the various chapters to a number of exhibits (tables and graphs) contained in the main reports; the more important of these are reproduced here, with the same exhibit number as in the main report followed by a suffix (A, B, C or D) denoting the study from which it was drawn.

The remaining sections of this letter of transmittal summarize in condensed form the main highlights of each of the four studies.

## 1. GRAIN SHIPPING COSTS

The economic analyses presented in this report indicate that use of the Port of Churchill and the rail line serving it as a route for export grain is likely to be economically viable into the 1990's under medium or low ocean freight market conditions, and under average or high world grain market conditions provided that the grain throughput levels are in the order of 600,000 tonnes per year or higher through the Port. This conclusion is based on the premise that none or only a portion of the line related costs of the rail line (estimated by the Canadian Transport Commission to be about $4.6 million* per year) should be charged against grain shippers. The above premise implies that even in the absence of grain movements through the Port, the rail line would be left open to move other traffic and to promote objectives of northern development, national defence and sovereignty. If Prairie grain shippers pay none of the line related costs, they would experience an estimated net saving (relative to no grain movement through Churchill) of about $3.1 million yearly in grain transportation and handling costs if the Churchill program were 1 million tonnes in 1991/92 under average ocean freight markets and normal or strong grain markets. All costs are expressed in constant 1985 dollars.

The conclusions as to the viability of the Port are also based upon the assumption that the Canadian Wheat Board can sell grain at Churchill for a price which reflects the actual marine transportation cost differential for onward delivery of the grain. That is, the grain selling price FOB Churchill would be lower than that FOB a lower St. Lawrence port by an amount approximately equal to the difference between ocean shipping costs from Churchill to the overseas destination and those from the lower St. Lawrence port to the overseas destination**. While CWB commercial secrecy precludes verifying this assumption there is reason to believe that it is largely true in years of normal and strong grain markets.

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* of which about $3.0 million is presently paid by grain shippers and the federal government as part of the rate base under the Western Grain Transportation Act and the remaining $1.6 million is borne by CN and its other customers.

** Grain transportation/handling costs via Churchill would therefore be smaller than those via the Great Lakes system by any savings in costs to move the grain to export positions in Churchill versus in the lower St. Lawrence port, less the above difference in ocean shipping costs.

The policy question to be addressed in this context is whether the potential savings in grain transportation/handling costs and other strategic reasons for continuing the Port and rail line in operation are sufficient to decide in favour of their continuing operation, recognizing the subsidy requirement for rail line related costs. In addressing this question, governments and other interested parties should consider the broader policy implications of ceasing the movement of grain through Churchill and abandoning the rail line. Among these policy implications (which are beyond the scope of analysis of this study), in addition to the immediate strategic and northern development factors mentioned earlier, is the consideration that the rail line and the Port do exist, the marginal cost of maintaining them in operation for grain exports is modest, they may be badly needed during the coming decades for strategic reasons and possibly for grain exports, and their future replacement costs if abandoned now would be large.

If the policy decision is to maintain the rail line and Port, then export grain traffic through this outlet should be maintained at substantial levels (greater than 600,000 tonnes per year and preferably in excess of 800,000 tonnes) both because of the savings that would result from its use at such levels and because it is the major existing economic contributor to continuing operation of the line and Port. The least desirable policy stance, from the economic point of view, would be to keep the Port open but move small volumes of grain through it.

## 2. RESUPPLY OPERATIONS

This study examined the physical and economic feasibility of expanded marine and air resupply operations through Churchill to serve communities in the Central Arctic. Currently the Northern Transportation Company Limited (NTCL) provides marine resupply from Churchill to six communities in Northwestern Hudson Bay, and air resupply services from Winnipeg and Churchill are provided by several carriers.

The economic analyses indicate that, if a reduced cost of land transportation (road and rail) from Winnipeg to Churchill can be negotiated based on higher resupply volumes, it would be economically attractive for Eastern Sealift vessels based in Montreal to make two or three trips each to Churchill to take on and deliver additional resupply cargoes before returning to Montreal at the end of the season. There is also an economic opportunity to extend NTCL services to serve Cape Dorset and Lake Harbour in Hudson Strait and possibly Sanikiluaq in the Belcher Islands. The feasibility of this would also depend on negotiating lower piggyback and rail rates from Winnipeg to Churchill and on allowing NTCL to charge on a marginal cost basis for the extended services.

Air cargo and passenger services in the Central Arctic corridor north of Churchill suffer from service discontinuities and the use of small, slow and relatively expensive aircraft. It is proposed that existing air service in the corridor north of Winnipeg be extended to provide direct service in the Winnipeg/ Churchill/Rankin Inlet/Hall Beach corridor.

If Churchill is to maintain and expand its role as an air resupply centre for the Arctic, however, positive steps must be taken to ensure that goods and services required by inhabitants of northern communities can be obtained there at prices competitive with those farther to the south, allowing for the extra transportation costs from Winnipeg or Thompson. As discussed more fully in the body of the report, this means that:

1. Lower road/rail rates must be negotiated for moving dry goods to Churchill;

2. Service improvements are required to reduce transshipment loss and damage; and

3. Institutional changes are needed so that surface/air resupply services to Churchill can be arranged through one agency.

If these changes are not made soon, there is a strong likelihood that air resupply services will be provided increasingly from communities farther south and Churchill's role will be increasingly eroded.

It is estimated that the use of Churchill as a secondary resupply base for Montreal-based vessels would attract about 11,000 tonnes per year of additional resupply traffic through Churchill and the expanded air service from Winnipeg north would attract about 3,000 tonnes of additional air cargo, which would increase existing resupply throughput at Churchill from about 21,000 tonnes per year to about 35,000-40,000 tonnes per year over the next few years. Resupply shipments over the Winnipeg/Churchill rail link would be about 65,000 tonnes per year including bulk fuel movements.

An action plan is recommended involving steps by the Government of the Northwest Territories, Government of Manitoba, Transport Canada, and the relevant shippers and carriers. If the plan succeeds in achieving the estimated resupply volumes, it would lead to approximately 250 additional jobs in Manitoba and about $4.5 million per year in additional labour income in the province, which would be largely offset by similar decreases of jobs and income in the Montreal and Edmonton regions. More importantly, the new services would produce a net reduction in both marine and air resupply rates to most Arctic communities in the Central Arctic and substantially improved air services in the corridor north of Churchill, serving Rankin Inlet, Hall Beach, and possibly Nanisivik and Resolute. A related, less tangible benefit would be a strengthening of the resupply role of Churchill and therefore of its viability as a strategic centre to help achieve other sovereignty, defence and economic objectives in Canada's North.

## 3. ADDITIONAL COMMODITIES

This study assessed some 20 commodities in terms of their potential as viable movements through the Port of Churchill. The list included the major grains, fodder and feed, phosphate rock, sulphur, coal, wood pulp,

potash, fertilizers and fertilizer ingredients, alumina and aluminum products, forest products, farm machinery and implements, Arctic ores, Arctic oil, North Dakota grains, and liquor imports.

Potential movement through Churchill was compared with existing or potential movements through competing ports (e.g. Vancouver, Thunder Bay) in terms of rates, seasonality considerations, institutional constraints, and (for potential future movements) the likelihood of occurrence of the movement.

Based on these analyses, a short list of potential commodity movements through Churchill was derived which included sulphur, coal and potash as exports and phosphate rock as an import movement. These were subjected to substantially more detailed transportation and handling cost analyses, including the development and costing of eight material handling schemes/ facilities at the Port. Various combinations of the short listed commodities were also assessed in this manner.

Essentially the conclusions of the study are negative in that no commodity was found to be more economic as a movement through the Port of Churchill than through existing export or import channels (Vancouver in most cases) when all costs were taken into account. Of all the potential movements, the one that comes closest to being economic through Churchill is a combination of the movement of sulphur (210,000 tonnes per year) from Alberta to Europe and to the U.S.S.R. during the Churchill navigation season, with potash (290,000 tonnes) moving from Saskatchewan to Brazil in year round quantities by stockpiling either at the mine or at Churchill. This was found to be between $1.48 per tonne and $3.55 per tonne more expensive than handling these movements through Vancouver. The most uneconomic movement considered, shipping 72,500 tonnes per year of potash to Brazil during the Churchill season only, would result in a greater expenditure of about $30 per tonne relative to movement via Vancouver. For most of the other schemes considered, movement through Churchill would be in the order of $5.00 to $12.00 per tonne more expensive than movement through Vancouver.

The study concludes with recommendations regarding monitoring and other activities aimed at keeping options open regarding the possible future attraction of additional commodities to move through Churchill.

## 4. SEASON EXTENSION

This study included an extensive physical, operational and economic assessment of the feasibility of extending the marine shipping season at Churchill. The study is based on the premise that the Port of Churchill can and will be operated at viable levels of grain throughput and that funding and other arrangements would be forthcoming within an appropriate policy framework as discussed more fully under the Grain Shipping Costs component of the study.

The assessments of season extension were carried out for several scenarios of grain throughput, ocean freight rates and ice conditions. The costs and benefits were estimated for week-by-week incremental extensions of the existing season in both the fall and the spring. That is, starting with the existing shipping season, which in recent years has extended from about July 26 to about October 18, incremental extensions in the fall were assessed to October 25, November 1, November 8, November 15, November 22, November 29 and December 6, and extensions in the spring were assessed for season openings on July 20, July 13 and July 6. It was found that it is technically and economically feasible to expand the existing 12 week shipping season at the Port of Churchill to 17 weeks, an extension of one week in the spring and four weeks in the fall, such that the extended season would last from July 20 to November 15.

Additional capital and operating costs to achieve the 17 week season would be minimal and a major institutional constraint, seasonal limits on insurance, has been largely removed as a result of discussions between the Government of Manitoba, the Government of Canada and the insurance industry held during the fall of 1985. This resulted in an agreement by the London underwriters to review the insuring conditions for vessels trading into Churchill and, as an interim measure, to provide insurance and assess premiums on a case-by-case basis taking into account factors such as the time of season, type of vessel, captain's experience in ice navigation, and other relevant factors. A more comprehensive insurance agreement will be developed during 1986 under which the insurance season will fall within the regulations set by Canada's Arctic Waters Pollution Prevention Act (AWPPA). It is proposed that relevant vessel types (in terms of degree of ice strengthening) would operate within the new season in accordance with AWPPA season limits.

An action plan is proposed to achieve the extended season, focussing on areas including insurance, communications, ice breaker service, ice monitoring and information programs and related measures.

## 5. CONCLUSIONS

Churchill is Canada's only deep water Arctic port with a rail connection to the south. As such, it is a unique asset in the context of national objectives such as defence, sovereignty and northern economic development.

Grain movements provide an economic basis for maintaining the Port and there is evidence from this study that economic benefits will accrue to Western grain producers if grain throughput is maintained at levels above about 600,000 tonnes per year and certain line related costs for the Churchill rail line (as noted in Section 1 above) are borne by government subsidy rather than by grain producers under the Western Grain Transportation Act and by CN. It is suggested that such direct government subsidization of the rail line is an appropriate policy if, in the opinion of the government, it would continue to maintain and operate the Port and rail line even if there were no grain moving through the Port.

The alternatives are to continue the present arrangements, which will put grain producers at an increasing disadvantage because of required costs for new Churchill rail cars or line improvements (these costs were included in the economic comparisons), or to eliminate the Churchill grain program. The latter would leave the government in the difficult position of either paying substantially larger sums to maintain the Port and rail line in operation without the economic base of grain traffic, or of closing the Port and rail line with a resultant loss in Canada's Arctic presence and disruption to the affected region and communities. It is hoped that the economic comparisons and other data presented in this study will assist the governments of Canada, Manitoba, the other Prairie provinces and the Northwest Territories in assessing these important policy trade-offs.

The other findings of the study flow from and depend on the above policy considerations. If it is decided to maintain and expand the Churchill grain program, then the Churchill shipping season extension from about three to about four months would be economically attractive. There is also an economic rationale for approximately doubling the flow of resupply traffic through Churchill, provided that reduced road/rail rates from Winnipeg to Churchill can be negotiated in this context. No immediate prospects for additional commodity movements were identified, but the option of attracting such movements in the future would be kept open. In the meantime, the proposed increased grain throughputs on the Churchill route would be a net economic advantage to Western Canadian grain producers under most market scenarios and the additional capacity of the Churchill route would be available to meet the requirements of expanded grain exports as they materialize in future years.

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My colleagues, Lee Sims and George Sladek, and I, along with the many other members of the consultant study team, wish to acknowledge with thanks the advice and direction of the Steering Committee during this extensive study. We hope that the study results will assist the relevant governments and private sector participants in dealing with the complex issues involved in using the Port of Churchill and related facilities as cost-effectively as possible.

Yours sincerely

IBI GROUP

Neal A. Irwin
Managing Director

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The contents of this report reflect the opinions of the Consultant and are not to be construed as the official policy of Transport Canada or Manitoba Highways and Transportation.

Dimensions and measurements contained in this report may appear in both imperial and metric units as a reflection of common usage and standard practice of the transportation industry.

## ACKNOWLEDGMENT OF PARTICIPATION

This Study (Port of Churchill Additional Commodities) was conducted on behalf of the Government of Canada, Transport Canada, and the Government of Manitoba, Department of Highways and Transportation, under the Canada-Manitoba Subsidiary Agreement on Churchill.

Consultant support to the IBI Group, the main consultants, was provided by the following firms:

Harvey Kriss + Associates Limited
Stevenson Hluchan & Associates Ltd.
Carr & Donald & Associates
Canadian Offshore Data Analysis
J. Steve Merrett Consulting Services
Allardice & Associates Ltd.
G. C. Baker
Captain Harold Cooper
Theo Joseph
Captain E. Pelletier

A multi-disciplinary steering committee composed of representatives from Transport Canada and the Manitoba Department of Highways and Transportation provided overall direction and facilitated information exchange with relevant organizations and individuals. The governments of the Province of Alberta and the Province of Saskatchewan also provided senior support to the steering committee and the study.

The contribution of all participants is gratefully acknowledged. Responsibility for the findings and conclusions presented herein rests with the consultants.

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# PORT OF CHURCHILL GRAIN SHIPPING COSTS

## STUDY D

## EXECUTIVE SUMMARY

### 1. STUDY OBJECTIVES AND SCOPE

This study was conducted on behalf of the Government of Canada, Transport Canada, and the Government of Manitoba, Department of Highways and Transportation, under the Canada-Manitoba Subsidiary Agreement on Churchill. It is part of an overall study of the Port of Churchill conducted on an integrated basis by IBI Group and its associated consultants, with the following components:

- Study A: Season Extension;
- Study B: Additional Commodities;
- Study C: Resupply Operations;
- Study D: Grain Shipping Costs.

This executive summary provides a brief overview of the objectives, scope, major findings and conclusions of Study D.

#### Objectives

As stated in the Terms of Reference, the study objectives are as follows:

A. "to clarify and explain the costs, and the elements of such costs, of moving grain by sea from Churchill within existing seasonal limits to foreign destinations over the past five years. No other type of cargo movement is to be considered."

B. "to identify and analyze any cost advantages that may obtain through the use of Churchill."

C. "to recommend any courses of action which may be taken, from the marine transportation aspect, to increase the utilization of the Port during the existing season, for the export of grain."

Study Scope

Reflecting the consultant's proposal and discussions at the commencement of the study, it was agreed that the scope as outlined above would be expanded to include an analysis of both rates and relevant costs which may not be reflected in current rates, for the export movement of grain by land to Churchill and by sea to typical overseas markets. The rates and costs for exporting grain through Churchill are to be compared with those of exporting grain through the alternate ports of Thunder Bay and typical lower St. Lawrence ports.

The study is also to explore the potential effects of selling grain on CIF (cost, insurance and freight) or other marine contract bases and to review other factors including chartering options, insurance costs, ice conditions, vessel availability and price and any others which affect the export of grain from Churchill. Finally, the study is to draw conclusions on the factors that influence the viability of Churchill as a grain exporting port and on the factors that influence the viability.

The sections of this Executive Summary mirror the chapter structure of the main report.

## 2. GRAIN MOVEMENT PATTERNS

During the 30 year period 1956-1985, movements of export grain through the Port of Churchill have averaged about 573,000 tonnes per year; the highest throughput was 755,200 tonnes in 1977 and the lowest was 308,800 tonnes in 1980. There has been a declining trend generally since

1977, and the average throughput over the past ten years was 545,000 tonnes per year. During the same period total grain exports from Canada to Atlantic destinations (Europe, Western and North Africa, the Mediterranean Coast of Asia and the East Coast of South America, the markets for grain that passes through Churchill), increased by about two-thirds. Most of this grain was exported through Thunder Bay and the St. Lawrence system.

During the period 1960-1973, 54 percent of the grain exported through Churchill went to the United Kingdom and 88 percent to Western Europe in total, with only 6.6 percent to Eastern European nations. During the period from 1974-1985, 56 percent of Churchill grain was shipped to Eastern Europe, compared to 24 percent to Western Europe; there was also a significant increase in shipments to Mediterranean and Persian Gulf destinations, from 3.7 percent in 1960-1973 to 15.8 percent in 1974-1985. In most years since 1971 the practice of the Canadian Wheat Board (CWB) has been to ship either wheat or barley almost exclusively in a given year through Churchill.

An examination of weekly grain receipts at the various export grain terminals in recent years indicates that, during the Churchill shipping season (normally about 12 weeks between the last week of July and the third week of October), the total movement of grain to all terminal elevators does not increase significantly and there is a reduction of grain flows through Thunder Bay while grain is being received at Churchill. No corresponding interaction is evident between Vancouver and Churchill flows.

The two main conclusions drawn from the analysis of grain movement patterns are as follows:

- grain exports to destinations served by Churchill are growing and are expected to continue to grow;
- during the Churchill navigation season, Churchill and the Thunder Bay/St. Lawrence route tend to be in competition for grain traffic with many of the same destination countries being served by both routes.

## 3. ANALYSIS OF RATES AND COSTS

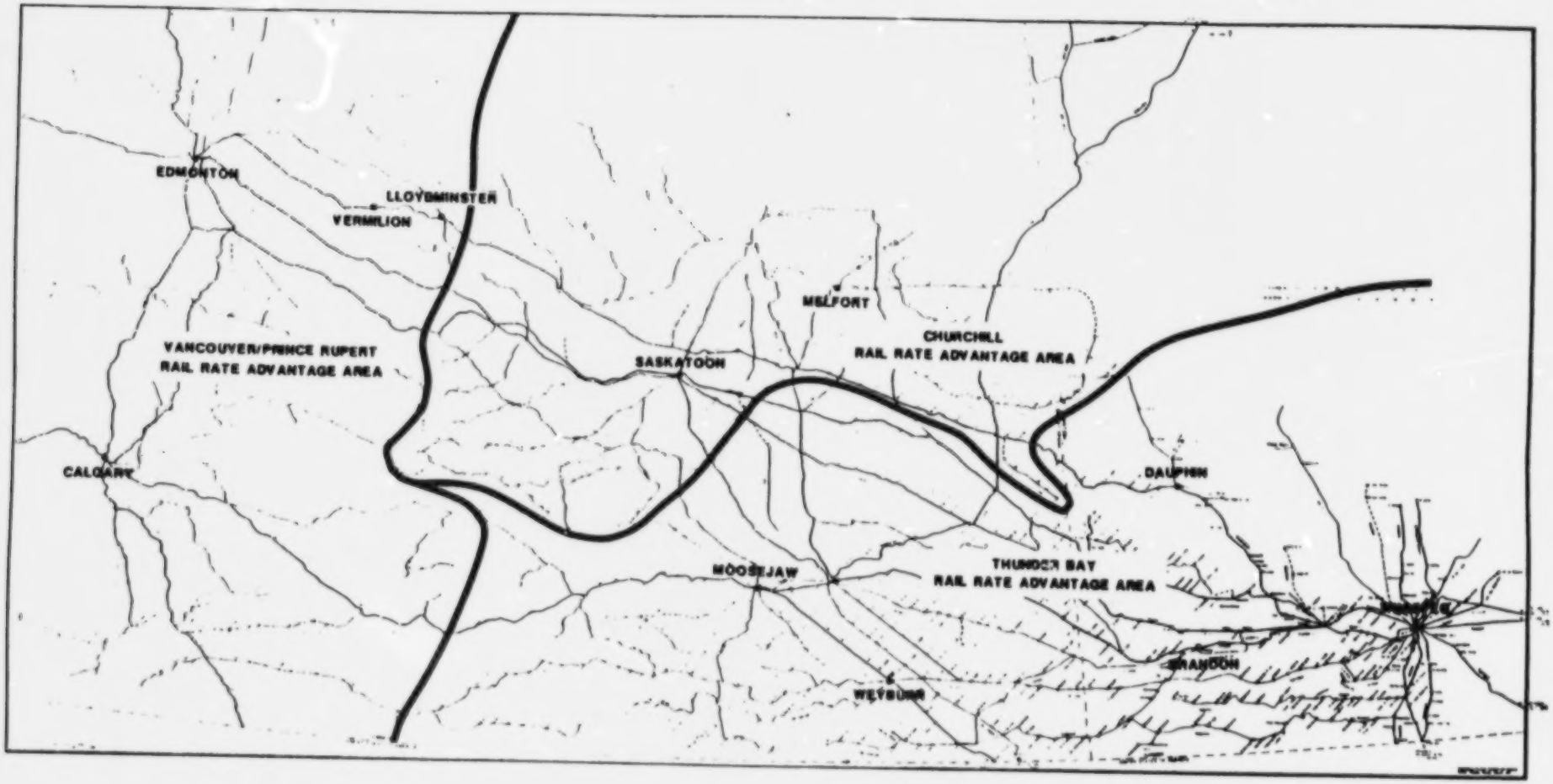
In recent years, the majority of grain shipped to Churchill has originated from CN shipping blocks in Northern Saskatchewan and Northwest Manitoba which have a lower rail rate to Churchill than to Thunder Bay or the West Coast. As shown in Exhibit 3.2 of Chapter 3 (reproduced following), the Churchill rail rate advantage area lies east of a north-south line slightly east of Lloydminster and north of an east-west line which passes between Saskatoon and Moose Jaw. The advantage in total rail rates (including the shipper's share and the federal government contribution) to Churchill versus to Thunder Bay in the current crop year is 92¢ per tonne from Saskatoon and $3.70 from Melfort, Saskatchewan. During the period 1978-1982 an average of 78 percent of wheat and barley shipments to Churchill originated at delivery points within the Churchill rail rate advantage area; this percentage dropped slightly to 72 percent during the period 1983-1985. Our analysis indicates that Saskatoon approximates the average source for grain shipped through Churchill. The weighted average rail rate advantage achieved relative to grain moving through Thunder Bay is about 95¢ per tonne, including grain shipped from outside of the Churchill rail rate advantage area, whereas grain from Saskatoon has an advantage of 92¢ per tonne to Churchill compared to Thunder Bay. It is recognized that, while the Canadian Wheat Board experiences these rail rate savings for grain shipped via Churchill, there are other costs of shipping grain to Churchill which are borne by all grain shippers in Western Canada and which may counterbalance these rate savings. This is dealt with in Section 4 below.

An extensive analysis was carried out of ocean shipping rates from Churchill and other Eastern Canadian grain exporting ports to destinations in Western Europe, and detailed analyses of ocean shipping costs were also carried out for the same routes, including development and application of an ocean shipping cost model. Three alternate marine routes were subjected to this analysis:

exhibit 3.2D

**RAIL RATE ADVANTAGE AREAS**

**FOR**
**CHURCHILL, THUNDER BAY &**
**VANCOUVER/PRINCE RUPERT**

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- Churchill to Northwestern Europe (e.g., Rotterdam);
- Thunder Bay directly to Northwestern Europe with an ocean going vessel; and
- Thunder Bay by laker to a lower St. Lawrence port with transshipment there to an ocean going vessel to Northwestern Europe.

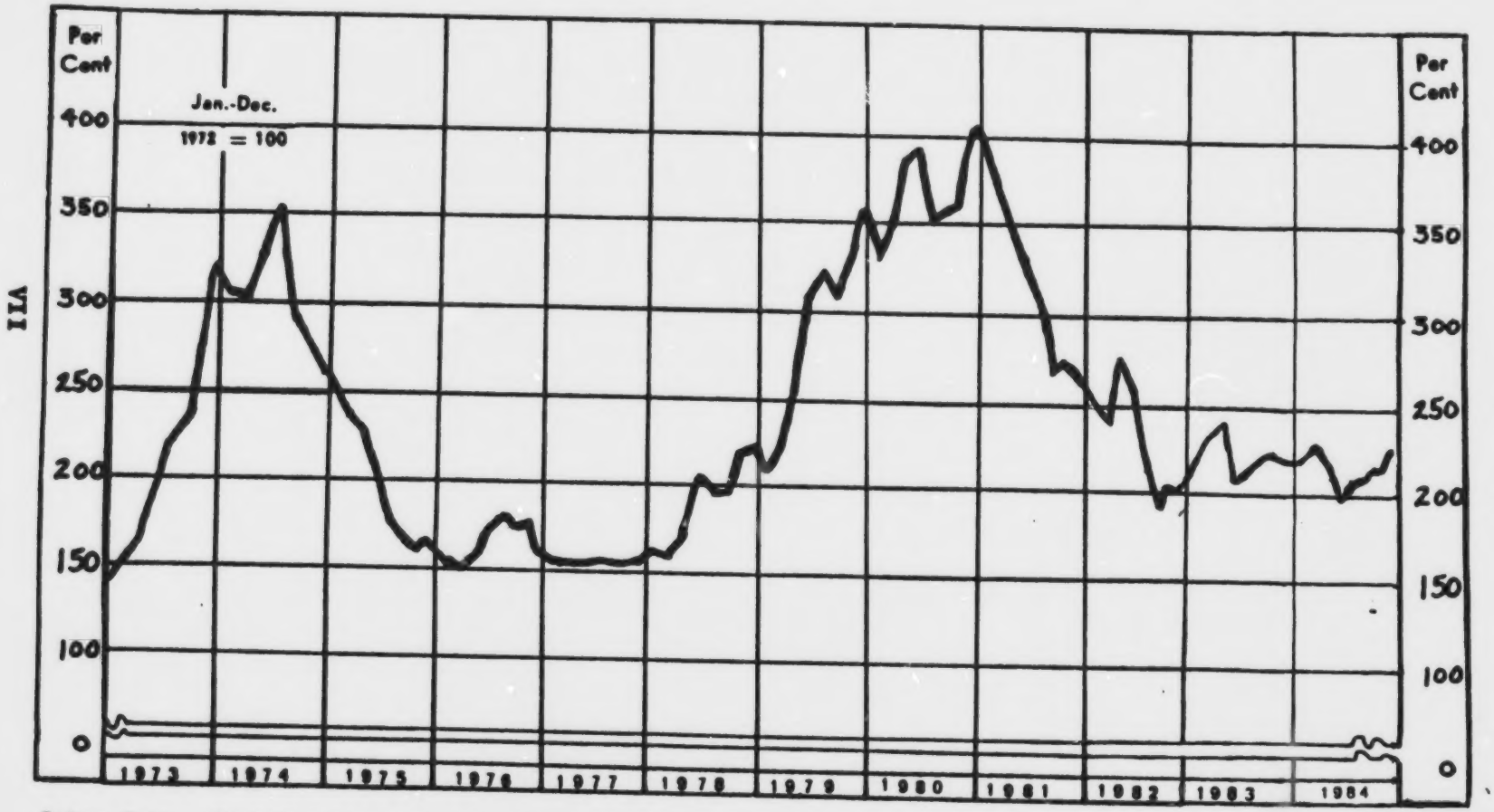
It was found that marine rates on these and other routes have been subject to substantial cyclical fluctuations, with recent peaks in 1974 and 1980, "medium" levels in 1975, 1979 and 1981, and low levels in 1972, 1977 and 1983-1985. These trends are illustrated in Exhibit 3.9 in Chapter 3 (following). Rates in years of strong ocean freight markets (reflecting high demand relative to the supply of vessels) are typically about twice as high as rates in years of low ocean freight markets (an oversupply of vessels relative to demand).

Ocean shipping costs (i.e., capital and operating costs experienced by the shipping companies as opposed to the shipping rates which they charge) were also examined to put the rate comparisons in perspective. They have been substantially more stable over the years. Typically, marine shipping costs between, for example, Baie Comeau and Rotterdam for grain, with a 50 percent backhaul, are estimated to be about three-quarters of the rate charged in a medium ocean freight market year; however, costs are significantly higher than rates charged in low ocean freight market years while profit margins are greater in high market years.

Comparisons were made of the total rates paid for moving wheat from Saskatoon, Saskatchewan to Northwestern Europe (e.g. Rotterdam) through Churchill and through Thunder Bay including full rail rates and terminal elevator charges as well as marine transportation rates and transfer elevator rates at a lower St. Lawrence port for grain moved by laker vessel from Thunder Bay. To reflect the effects of the cyclical fluctuations in ocean marine rates as noted above, these comparisons were

exhibit 3.9D

WEEKLY GENERAL FREIGHT CHARTER INDEX: 1973-1984




Taken from: Maritime Research Incorporated, Chartering Annual, 1984

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carried out for low, medium and high ocean freight markets. As shown in Exhibit 3.14, from Chapter 3 of the report, the total rate via Churchill is lower than the total rate via Thunder Bay direct (with an ocean going vessel) or via Thunder Bay and a laker vessel (with transfer at a lower St. Lawrence port), for all three ocean freight market scenarios.

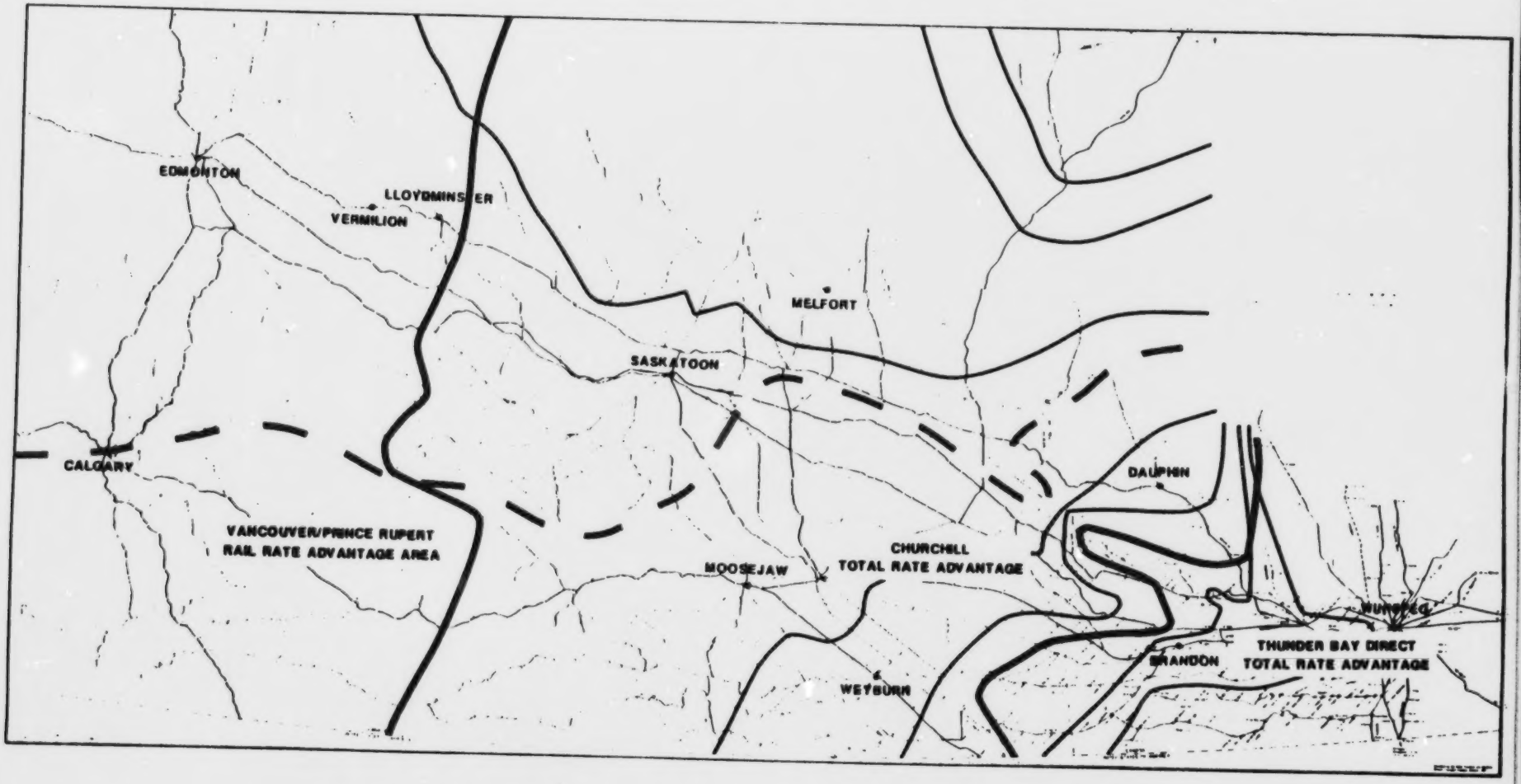
During medium ocean freight market conditions the total rate via Churchill (in 1985 dollars) is about $14.00 less than via Thunder Bay direct and about $12.40 per tonne less than via Thunder Bay and a St. Lawrence port. During years of low ocean freight market conditions the total rate via Churchill is about $7.00 per tonne less than via Thunder Bay direct and about $17.00 per tonne less than via Thunder and a St. Lawrence port; during high ocean freight market years these differences are about $10.00 per tonne and $6.00 per tonne, respectively. Similar comparisons were carried out for other Prairie origins which, as illustrated in Exhibit 3.17 (following), show that when total rail, elevator and marine rates are taken into account (rather than simply the rail rates) the "Churchill total rate advantage area" is very much larger, including virtually all of Saskatchewan and a substantial portion of Western Manitoba, including Dauphin.

## 4. COST COMPARISONS

As has been pointed out in a number of recent studies, there are certain cost elements (e.g., rail line related costs), not currently reflected in the rate structure upon which the previous sections were based, which should be taken into account in comparing the total grain transportation cost to Canadians and to overseas grain customers for grain shipped via the three routes described above. Because a number of these cost elements contain fixed costs (which do not vary with the amount of grain handled), the cost per tonne of grain throughput varies with the level of throughput, with decreasing costs per tonne at higher throughput levels. In order to take this into account, the total comparisons (based on the additional cost elements described in Chapter 4) for the three routes were carried out under six grain throughput scenarios for the Port

exhibit 3.1/D

BOUNDARY OF AREA HAVING A TOTAL RATE ADVANTAGE TO CHURCHILL IN 1985

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of Churchill: zero throughput, 250,000 tonnes per year, 500,000 tonnes per year, 750,000 tonnes per year, 1,000,000 tonnes per year and 1,250,000 tonnes per year, with corresponding variations in the Thunder Bay grain throughput.

Chapter 4 of the report presents an extensive discussion of various cost elements and the reasons for including some of these and not including others in the comparison. Among the elements discussed are those relating to the grain collection system, port and terminal facilities and the marine transportation system. Within each of these systems the possibility of there being costs that are not adequately reflected in the rates or which would change the rates for different magnitudes of Churchill shipping programs on the Churchill route or on the alternative routes is discussed.

## Grain Collection System

It was concluded that within the grain collection system (including the primary elevator) there was no evidence that the Churchill shipping program incurred costs any higher than the movement of the same grain on an alternative route.

## Rail Transportation System

The current rail rate structure is based on distance alone with no variation in the rates charged by origin area or by destination. It was concluded that the railway rates charged under the Western Grain Transportation Act (WGTA) reflect grain movement costs in an adequate manner in general but that it is not possible to attribute specific costs to particular movements without a very detailed enquiry into the costs of various routes which would have to be much more detailed than previous studies of railway grain movement such as the Hall and Snavely enquiries.

There are some railway volume related costs associated with conditions on the Churchill line which will be required to maintain service which are not required on other routes. Difficult soil conditions now require only boxcars to be used on this route. As described in substantial detail in Chapter 4 and Appendix E of the report, while the number of boxcars is sufficient currently and for the next few years, it is anticipated that there will be insufficient boxcars for this purpose by 1991-1992. In order to address this problem, one of three basic actions will be required to continue grain deliveries by rail to Churchill:

- rehabilitate additional boxcars; in this case there will be an additional capital cost as well as additional operating costs associated with movement of these boxcars;
- purchase specialized equipment for the Churchill route such as the articulated hopper car that has been developed and a prototype of which is now being tested on the Churchill line by CN; again, there will be capital and additional operating costs associated with this option compared to the use of conventional hopper cars;
- refurbish the Churchill line (through the use of "cryo-anchors" to avoid thawing of perma-frost sink holes during the summer which currently can cause road-bed problems sufficient to derail conventional hopper cars) in order that conventional hopper cars can move on the Churchill line.

More information on the three alternatives is expected to be available later based on current studies being carried out by CN under the Canada-Manitoba Subsidiary Agreement on Churchill and drawing on the results of the prototype articulated hopper car tests and other analyses. A preliminary assessment of the three alternatives, carried out as part of this study and described in Appendix E suggests that under certain assumptions the articulated hopper car approach may be the most cost-effective but that either of the other two approaches might prove more cost-effective depending on factors such as the useable life of rehabilitated boxcars, capital and operating costs of the new articulated

hopper cars, and the actual cost of refurbishing the rail line. For purposes of this study, the additional annual costs of the articulated hopper car approach were used; as described more fully in Chapter 4 the annualized costs associated with an articulated hopper car program are similar to the annualized costs estimated for a boxcar rehabilitation program.

There are also three existing line related costs associated with the use of the Churchill rail line which are significant to the comparison:

- o $680,000 for 1985/86 as a special subsidy paid to CN out of WGTA funds for additional line related costs of the line from Thompson Junction north to Churchill;
- o $2,281,000 for the basic line related costs of the Herchmer Subdivision (from Gillam to Churchill) as a grain dependent branch line which is included in the WGTA rate base and therefore paid by all grain shippers and the federal government unlike the line related costs of the routes to other ports; and
- o $1,657,000 for line related costs of the northerly section of the Thicket Subdivision (from Thompson Junction to Gillam) now paid by CN and other shippers.

If the Churchill line is maintained in operation these costs totalling about $4.6 million must be met by the grain shipper or by others.

Port and Terminal Facilities

Another set of cost elements relates to port and terminal facilities, including interest charges on capital facilities, terminal elevator costs, extra Canadian Grain Commission inspection costs at Churchill, extra costs of unloading boxcars, overtime charges for elevator use, and capital costs of future improvements. The conclusion of this part of the analysis is that there are certain additional costs associated with maintaining Churchill port and terminal facilities in operation which would not be reflected in additional costs at other ports if the route were no longer used for grain.

## Marine Transportation System

The final set of cost elements considered relates to the marine transportation system, including items such as the St. Lawrence Seaway tolls, and additional Transport Canada and Canadian Coast Guard en route costs associated with operation of the Hudson Bay route in addition to the actual freight rates charged from the ports to the final destination overseas. The comparison indicates that there is a marine freight rate advantage for grain that is moved from Churchill, net of the impacts of the other factors. Including the full value of the marine freight rate differential in the comparison between routes makes the implicit assumption that the prices for grain that the Canadian Wheat Board realizes at each port will fully reflect the freight rate differentials of the alternative routes to the overseas destinations. The comparison uses the marine rates actually paid for voyages from Churchill, Thunder Bay and lower St. Lawrence ports to Northwestern Europe (Antwerp to Hamburg). These were used as representative of the rate differentials for the routes from Churchill ports to the actual destinations to which most Churchill grain is going.

## Analysis of Results

Estimates are then made in Chapter 4 of the relative total cost advantages/disadvantages in grain transportation and handling that would be expected to result from the different levels of Churchill throughput referenced earlier. In each case, the comparison is with the option of moving no grain through Churchill. The analyses are carried out and the results presented for 1986/87 crop year and for the 1991/92 crop year, that is with and without the costs associated with acquiring and operating new rail equipment for the Churchill service which will be necessary by the latter year. Because of the significance of the railway line related costs, the results are presented for each of the two years with and without the additional line related costs. A summary of the results is presented in Exhibit 4.11 (following).

exhibit 4.11D

SUMMARY OF OVERALL SYSTEMS SAVINGS
RELATIVE TO NO GRAIN MOVEMENT THROUGH CHURCHILL
(1985 $000's)

| | 1986/87 | | 1991/92 | |
|---|---|---|---|---|
| | 500,000 tonnes | 1,000,000 tonnes | 500,000 tonnes | 1,000,000 tonnes |
| Rail System Volume Related Cost Savings | 460 | 920 | -1,069 | -2,138 |
| Port Cost Savings | -4,035 | -4,035 | -4,035 | -4,035 |
| Marine System Cost Savings | 4,639 | 9,278 | 4,639 | 9,278 |
| Total Cost Advantage if Line Related Costs not paid by Grain Shippers | 1,064 | 6,163 | -465 | 3,105 |
| (Savings per tonne) | (+2.13) | (+6.16) | (-0.93) | (+3.11) |
| Railway Line Related Costs | -4,618 | -4,618 | -4,618 | -4,618 |
| Total Cost Advantage if Line Related Costs Paid by Grain Shippers | -3,554 | 1,545 | -5,083 | -1,513 |
| (Savings per tonne) | (-7.11) | (+1.55) | (-10.17) | (-1.51) |

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If the Churchill line is not used for grain movement in future, an important question must be addressed: Will the line will be completely abandoned or will it continue to be used for carrying other traffic? If the line would be kept open even if no grain were carried on it, then the line related railway costs should not be included in the comparison, since these costs would still have to be borne by government, the railway or other shippers even though they would no longer be paid by grain shippers. On the other hand, if the rail line would be completely abandoned, then the line related costs should be included in the comparison since they would in fact be "saved" by the Canadian transportation system and shippers. There would, of course, be other cost implications of completely abandoning the Churchill line associated with disruption and dislocation of the other users of the line and the communities served by it as well as reductions in Canada's ability to achieve national objectives related to sovereignty, defence, Northern development and resupply of Arctic communities but these are among the considerations that are relevant to addressing the issue of complete abandonment of the Churchill line rather than the issue of use of the Port for grain exports.

The results of this analysis are also sensitive to the assumption that the prices for grain realized at the ports reflect the actual freight rate differentials from the ports to the overseas destination. While it is reasonable to assume this, if a larger discount has to be offered at Churchill (relative to the lower St. Lawrence) then the benefits of shipping grain through Churchill would be reduced.

The following conclusions flow from the cost comparisons described in Chapter 4:

1. There is a marine transportation advantage associated with the use of Churchill compared to Thunder Bay for grain moving to Northwestern Europe and other Atlantic markets.

2. This marine transportation advantage more than compensates for the total costs associated with using the

Port and terminal facilities, for higher volumes of grain movement through Churchill.

3. To the extent that the CWB captures the marine freight advantage in the prices charged to buyers, these differences will represent a gain to Canada and to grain growers.

4. There are also railway system costs associated with the Churchill route which are not specifically reflected in the Churchill rates. These costs are associated with the need to have specialized cars for use on the Churchill line (volume related costs) and with the cost of maintaining the line to Churchill (line related costs) which are currently charged to grain transportation.

5. The economic advantage of using the Churchill route for grain movement is reduced if the volume related additional rail costs are taken into account (e.g., to provide special rail equipment to operate on this line), but there would still be an advantage for Churchill grain throughput levels above about 600,000 tonnes per year by 1991/92.

6. When the costs of maintaining the Churchill line in operation are included as a cost of shipping grain through Churchill (and most of these are currently attributed to grain transportation), the Churchill route shows an overall advantage for movements over about 850,000 tonnes under the current railcar supply situation for average ocean freight rates. When new cars would be required for shipment through Churchill (by 1991/92) use of Churchill at annual throughputs would result in a cost penalty under about 1.25 million tonnes annually over the long run when the full range of ocean freight rate market situations are encountered.

7. It is not at all certain that the rail line from Thompson Junction to Churchill would be abandoned if grain were no longer shipped through Churchill. In this case these line related costs would not be actually saved by eliminating the Churchill grain program and the economic comparison should not include the cost of maintaining the Churchill line in operation. In this case there would be an economic advantage in using Churchill for higher throughput levels, even by 1991/92 when new cars would be required, for annual throughputs above about 600,000 tonnes.

8. It does not seem equitable to charge grain shippers for all of the line related costs of the Churchill route unless this line is maintained specifically for the movement of grain. If in fact the line would not be abandoned if grain were no longer shipped, then consideration should be given to paying some or all of the line related costs out of general government revenues, reflecting the importance of the Hudson Bay route for Canadian sovereignty, defence, Northern development and Arctic resupply as noted earlier.

9. If the Port of Churchill is kept open for grain exports, the greater the volume that is shipped the better off are the grain shipper and the overall grain transportation system. Higher costs occur when Churchill is kept open but only relatively small volumes of grain are shipped through the Port.

## 5. OCEAN SHIPPING ARRANGEMENTS

Chapter 5 presents an assessment of alternative ocean shipping arrangements for grain, in terms of their potential usefulness as a means of attracting more grain traffic through the Port of Churchill.

Currently, FOB (Free on Board) is the predominant shipping option used at Churchill. Under this option, as illustrated in Exhibit 5.1 of Chapter 5, the seller (or his agent) pays to load the vessel at the Canadian port and the buyer (or his agent) pays all other ocean shipping costs including ocean freight and cargo insurance. The major alternative to FOB is CIF (Cost, Insurance, Freight) under which the seller pays to load the vessel and also for the ocean freight and insurance costs. C&F is a variation on this under which the seller pays to load the vessel and for the ocean freight but the buyer pays for the cargo insurance. The fourth ocean shipping option discussed is C of A (Contract of Affreightment), under which there is a special contract between the seller and the shipowner or the buyer and the shipowner to move a specified large volume of a commodity between a specified set of origins and destinations over an extended time period (often several years). Such an arrangement might typically be used for moving a large annual volume of ore from a mine to an

overseas smelter every year but is rarely seen in the more volatile grain trade.

The overall conclusion of our assessment of alternative ocean shipping arrangement options for Churchill grain exports is that an increased use of CIF shipments by the Wheat Board would not significantly improve the level of use of the Port of Churchill. The major buyers of grain from Churchill over the past six years have been Eastern Bloc and Third World Nations which have state shipping fleets and would therefore wish to continue buying grain on an FOB basis. Shipments to Northwest Europe would be more suitable for possible CIF arrangements, but shipments to these destinations are currently being handled by accredited exporters (multi-national grain companies acting on behalf of the Canadian Wheat Board) which have considerable experience in the ship chartering business. There is little reason to believe that the Wheat Board would be able to achieve significantly lower ocean rates if it were to enter the business of chartering vessels on a regular basis. Under certain special circumstances, in particular during a period of a rapidly rising ocean freight market, there might be some opportunity for the Wheat Board to gain ocean rate savings by chartering vessels on a time basis for repeated voyages, but such an arrangement would also carry with it considerable risks to the Board.

Overall, therefore, while a CIF arrangement would potentially allow the Board to control its shipping arrangements more fully and therefore direct more vessels to Churchill, the impracticality of such arrangements with Eastern Bloc and Third World buyers and the risk involved in such arrangements with other buyers are such that alternative methods of arranging ocean freight from Churchill hold little potential, in the view of the study team, for increasing the use of the Port relative to the existing FOB arrangement.

## 6. PORT CAPACITY ANALYSIS

Chapter 6 of the report presents an analysis of the grain throughput capacity of the railway system, elevator and ship loading facilities comprising the Port of Churchill grain transportation/handling system. It is important to understand the levels of throughput which can be achieved by the Churchill system under various operational and vessel arrival circumstances and the average vessel waiting time that would likely result at various levels of throughput, the components of the system which are the limiting factors on its capacity under various circumstances, and the implications of this in terms of improving the system and its economics.

In order to assess these questions systematically, a computerized model was developed to simulate Port operations including: train movement, railcar unloading, grain cleaning, vessel loading, and vessel movements at the Port. The model is described in Appendix F and its results are discussed in Chapter 6. It was calibrated in terms of 1985 operations and was able to reproduce the operational features and vessel delays actually observed at the simulated throughput levels, within reasonable tolerances. As a further test, the model was operated for throughput levels and number of arriving vessels similar to those experienced in 1976 (a year of large grain throughput) and again the model was able to reproduce with reasonable accuracy the vessel delays actually experienced that year.

Some thirteen additional runs of the Port capacity model were carried out, as summarized in Exhibit 6.1 of Chapter 6 (following), to simulate operating conditions at annual throughput levels of 700,000 tonnes, 1,050,000 tonnes and 1,400,000 tonnes, respectively, under various conditions of: ship arrival patterns; number of hours per day worked for unloading railcars, cleaning grain and vessel loading; and the amount of available elevator capacity for storage.

# exhibit 6.1D

SIMULATION RESULTS

| CASE NO. | THROUGHPUT | | SHIP ARRIVAL TYPE | HOURS OF OPERATION | | | ELEVATOR CAPACITY (000's tonnes) | AVERAGE SHIP TIME (hours) |
|---|---|---|---|---|---|---|---|---|
| | VESSELS | (000's tonnes) | | UNLOADING CARS | CLEANING | VESSEL LOADING | | |
| Actual | 12 | 330 | Actual 1985 | N/A | N/A | N/A | 112 | 143 |
| 2 | 12 | 330 | Random | 12 | 12 | 10 | 112 | 149 |
| 3 | 24 | 700 | Random | 12 | 12 | 10 | 112 | 200 |
| 4 | 24 | 700 | Random | 20 | 20 | 10 | 112 | 195 |
| 5 | 24 | 700 | Random | 20 | 20 | 20 | 112 | 104 |
| 6 | 36 | 1,050 | Random | 20 | 20 | 20 | 112 | 183 |
| 7 | 36 | 1,050 | Random | 24 | 24 | 24 | 112 | 166 |
| 8 | 48 | 1,400 | Random | 20 | 20 | 20 | 112 | 264 |
| 9 | 48 | 1,400 | Random | 24 | 24 | 24 | 112 | 260 |
| 10 | 48 | 1,400 | Uniform | 24 | 24 | 24 | 112 | 89 |
| 11 | 48 | 1,400 | Random | 24 | 24 | 24 | 200 | 257 |
| 12* | 48 | 1,400 | Random | 20 | 20 | 20 | 112 | 241 |
| 13** | 48 | 1,400 | Random | 24 | 24 | 24 | 112 | 208 |
| 14*** | 48 | 1,400 | Random | 24 | 24 | 24 | 112 | 166 |

* Note shiploading capacity doubled to 1,800 tonnes/hour
** Only one grain type moved through port
*** Grain arranged to arrive six days earlier

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The conclusions drawn by the study team from the simulation results are as follows:

- the practical capacity of the elevator, assuming the present configuration, is approximately one million tonnes per year during the current shipping season, or about 85,000 tonnes per week over 12 weeks;

- if vessel arrivals could be made more uniform and grain arrivals coordinated with these vessel arrivals, the capacity could be higher, in the order of 1.4 million tonnes per year;

- on the basis of the spread of types of grain analyzed (three different types of grain were used in the simulation runs) the amount of storage provided by the elevator was found to be balanced with the handling rates;

- the only practical basis to increase throughput would be to increase all three handling rates including unloading, cleaning and vessel loading. At 700,000 tonnes per year throughput, with 20 hours per day of operation for car unloading, grain cleaning and vessel loading, the estimated average vessel waiting time would be about 4.3 days; this would rise to about 8.1 days with only 10 hours per day of vessel loading. At 1,050,000 tonnes per year throughput, the estimated average vessel waiting time would be about 7.6 days with 20 hour unloading shifts, and this would drop to an estimated 6.9 days if the shifts were increased to a 24 hour per day operation. At 1,400,000 tonnes per year throughput, vessel waiting times would rise to over 10 days on average unless the number of grain types were reduced or the vessel arrivals are uniform rather than random; under the latter situation, the estimated average vessel waiting time would drop to about 3.7 days.

The results confirm that, with multiple shift operations, the Port and its rail and ocean interfaces are capable of handling one million tonnes in a 12 week season and, under controlled circumstances, this level could be exceeded.

## 7. CONCLUSIONS AND RECOMMENDATIONS

The economic analyses presented in this report indicate that use of the Port of Churchill and the rail line serving it as a route for export grain is likely to be economically viable into the 1990's under medium or low ocean freight market conditions, and under medium or high world grain market conditions provided that the grain throughput levels are in the order of 600,000 tonnes per year or higher through the Port. This conclusion is based on the premise that the line related costs of the rail line (currently about $4.6 million per year) are government-subsidized (in recognition of the Port's broader role and strategic significance) rather than being borne by the grain shipper.

The policy question to be addressed is whether the potential savings in grain transportation/handling costs and the other strategic reasons for continuing the Port and rail line in operation are sufficient to decide in favour of their continuing operation, recognizing the subsidy requirement for rail line related costs. In addressing this question governments and other interested parties should consider the broader policy implications of ceasing the movement of grain through Churchill and abandoning the rail line. Among these policy implications (which are beyond the scope of analysis of this study), in addition to the immediate strategic and Northern development factors mentioned earlier, is the consideration that the rail line and the Port <u>do</u> exist, the marginal cost of maintaining them in operation for grain exports is modest, they may be badly needed during the coming decades for strategic reasons and possibly for grain exports, and their future replacement costs if abandoned now would be large.

If the policy decision is to maintain the rail line and Port, then export grain traffic through this outlet should be maintained at substantial levels both because of the savings that would result from its use at such levels and because it is the major existing economic contributor to continuing operation of the line and Port. The recommendations presented

below are submitted to assist in on-going development and operation of the Hudson Bay route if this policy option is selected:

1. In terms of grain exports the Port will be economically viable only for higher levels of grain throughput, beyond approximately 600,000 tonnes per year. Maintaining the Port and the railway line and not using it at or above such throughput levels is the worst option in terms of the economics of handling and transporting export grain.

2. Some investments would be required in the elevator under these conditions. The major one is the implementation of a dust control system which will permit the elevator to meet regulatory standards and improve the safety and environment of the workers, at a capital cost of about $5 million in 1985 dollars. The cost of this improvement has been included in the economic comparisons.

3. The line related costs of the Churchill line, currently about $4.6 million per year, should be paid for out of general government subsidies, rather than out of subsidies ear-marked for grain transportation and out of grain freight rates, as a large proportion of these costs are paid now. This would be consistent with the underlying policy decision to maintain the line and the Port in continuing operation for the reasons cited above.

4. To maintain grain service on the Churchill route will require action to ensure a supply of cars. In the short term this may be done by an interchange agreement between CP and CN to permit CP cars to be used for this movement. This may also reduce railway operating costs somewhat. Over the longer term three options are possible: rehabilitation of additional boxcars, construction of new cars specially designed for the line such as the articulated hopper car now under development, or refurbishment of the line so that it can handle conventional hopper cars. An early decision on the best method is required so that design and methods of financing can be developed. The estimated costs of this articulated hopper car option were included in the economic comparisons.

5. Consultation should take place among the Canadian Wheat Board, the Governments of Canada and Manitoba and other interested parties in order to reach a consensus on how

to achieve the benefits associated with the use of the Port of Churchill for grain exports.

6. Overseas buyers and shipowners should be made more familiar with operations through the Port of Churchill. It was found that some had an "irrational" fear of taking delivery of grain through the Port. The Governments of Canada and Manitoba have already made a start in this by familiarizing the international insurance business with Port operations and improvements made to the operation of the sea routes to and from Churchill.

7. Better communications and information services should also be established to ensure that captains sailing to and from Churchill, particularly early and late in the season are fully informed about ice conditions and that the Canadian Coast Guard is informed of vessel arrivals and departures so that ice breaking escort services can be provided on a timely basis. This is discussed more fully in the Study A report.

If the decision is taken that the line should be closed over the long term then the study team has the following conclusions and recommendations:

1. Today, with existing car supply, the Port should be used for Churchill volumes of over about 800,000 tonnes per year. If this volume can be achieved then the Port and railway line should be kept open until attrition in the boxcar fleet no longer permits this level of throughput.

2. The elevator and the line should be maintained in safe operation for this period with a minimum of new capital investment.

The conclusions as to the viability of the port are also based upon the assumption that the Canadian Wheat Board can sell grain at Churchill for a price which reflects the actual marine transportation cost differential for onward delivery of the grain. While CWB commercial secrecy precludes verifying this assumption there is reason to believe that it is largely true in years of normal and strong grain markets and that discounts in years of weak grain sales would still be less than the entire marine freight rate differential.

In the meantime, it is hoped that the economic comparisons presented in this report will assist the Government of Canada, the Government of Manitoba and other interested parties in reaching the most appropriate policy decision, in the long term interests of the country and its various regions.

# PORT OF CHURCHILL RESUPPLY OPERATIONS

## STUDY C

## EXECUTIVE SUMMARY

### 1. STUDY OBJECTIVE AND SCOPE

This study was conducted on behalf of the Government of Canada, Transport Canada, and the Government of Manitoba, Department of Highways and Transportation, under the Canada-Manitoba Subsidiary Agreement on Churchill. It is part of an overall study of the Port of Churchill conducted on an integrated basis by IBI Group and its associated consultants, with the following components:

- Study A: Season Extension;
- Study B: Additional Commodities;
- Study C: Resupply Operations;
- Study D: Grain Shipping Costs.

This Executive Summary provides a brief overview of the objective, scope, major findings and conclusions of Study C.

#### Objective

As stated in the Terms of Reference, the study objective is:

> "to evaluate options to preserve and expand rail, marine and air resupply operations at Churchill."

#### Study Scope

The study is to examine three principal questions which relate to the long term preservation and expansion of Churchill's resupply role:

1. How might the operational efficiency of resupply activity at Churchill be improved?

2. Are there any economically viable options for increasing the ex-Churchill share of northern resupply traffic?

3. Would extension of the operating season of the Port open any opportunities for improving and/or expanding the tug and barge resupply operation?

In addressing these questions, the study is to analyze current operations, develop forecasts of commodity movements to the year 2000, identify technically feasible options for handling the future traffic efficiently and improving the level of service, and conduct an economic assessment of the options. The study is to evaluate prospects for increasing the share of north-bound traffic which is handled through Churchill and assess the impact of such additional traffic on the performance of the resupply activities at Churchill. A strategy is to be proposed for improving and expanding Churchill's role in air and marine resupply operations.

The sections of this Executive Summary mirror the structure of the main report.

## 2. PRESENT SERVICES AND PROJECTIONS

Chapter 2 of the report describes the existing and potential resupply area, its population and its present marine, rail/road and air resupply services. It presents information on the amount of cargo delivered by each of the major services into the region, presents projections of population to the year 2004 and makes tonnage projections based on these.

The study area is defined as the Keewatin region of the Northwest Territories plus, in terms of marine resupply, an area extending north into Foxe Basin, northeast to the easterly entrance of Hudson Strait, east

to the coastal communities bordering on the eastern side of Hudson Bay and James Bay, and south to the Ontario coast line of Hudson Bay. In terms of air resupply, the study area includes the Keewatin, the eastern communities of Kitikmeot and much of Baffin Island. (See Exhibit 1.1 of the report, reproduced following).

There are approximately 20,000 persons living in the combined study areas, of whom about 17,000 are in the area considered potential to marine resupply wholly or partly from Churchill and about 10,000 are in the area considered potential for air resupply.

Existing Marine Services

There are three major sources of marine shipments into the Arctic communities: the Mackenzie River system, the Port of Churchill, and the Port of Montreal. The routes generally followed by marine services are shown in Exhibit 2.1 of the report (following) and the road and rail access routes to the Port of Churchill are shown in Exhibit 2.4 (following). In addition, the Port of Moosonee in James Bay offers ferry services in James Bay and to adjacent coastal communities. Appendix A of the report describes marine resupply facilities at the Port of Churchill.

Six ports in the Keewatin are served from Churchill by Northern Transportation Company Ltd.* (NTCL): Eskimo Point, Whale Cove, Rankin Inlet, Chesterfield Inlet, Baker Lake and Coral Harbour (see Appendix B). NTCL provides this service with one tug and four barges. In normal operation, the tug takes two barges to a community, unloads the fuel and then beaches the barges to permit them to be off-loaded by crews flown in from Churchill. When off-loaded, the goods are taken to the customer's warehouse or specified locations. The tug then returns to Churchill with two empty barges and picks up two loaded barges for a trip to another community.

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* In late 1985 NTCL was sold by the Government of Canada to the Nunasi Corp.

exhibit 1.1C

## CHURCHILL STUDY AREA

exhibit 2.1C

## ARCTIC MARINE RESUPPLY SERVICES

**Mackenzie River Western Arctic Service**

**Hudson Bay Keewatin Service**

**Eastern Arctic Sea Lift Service**

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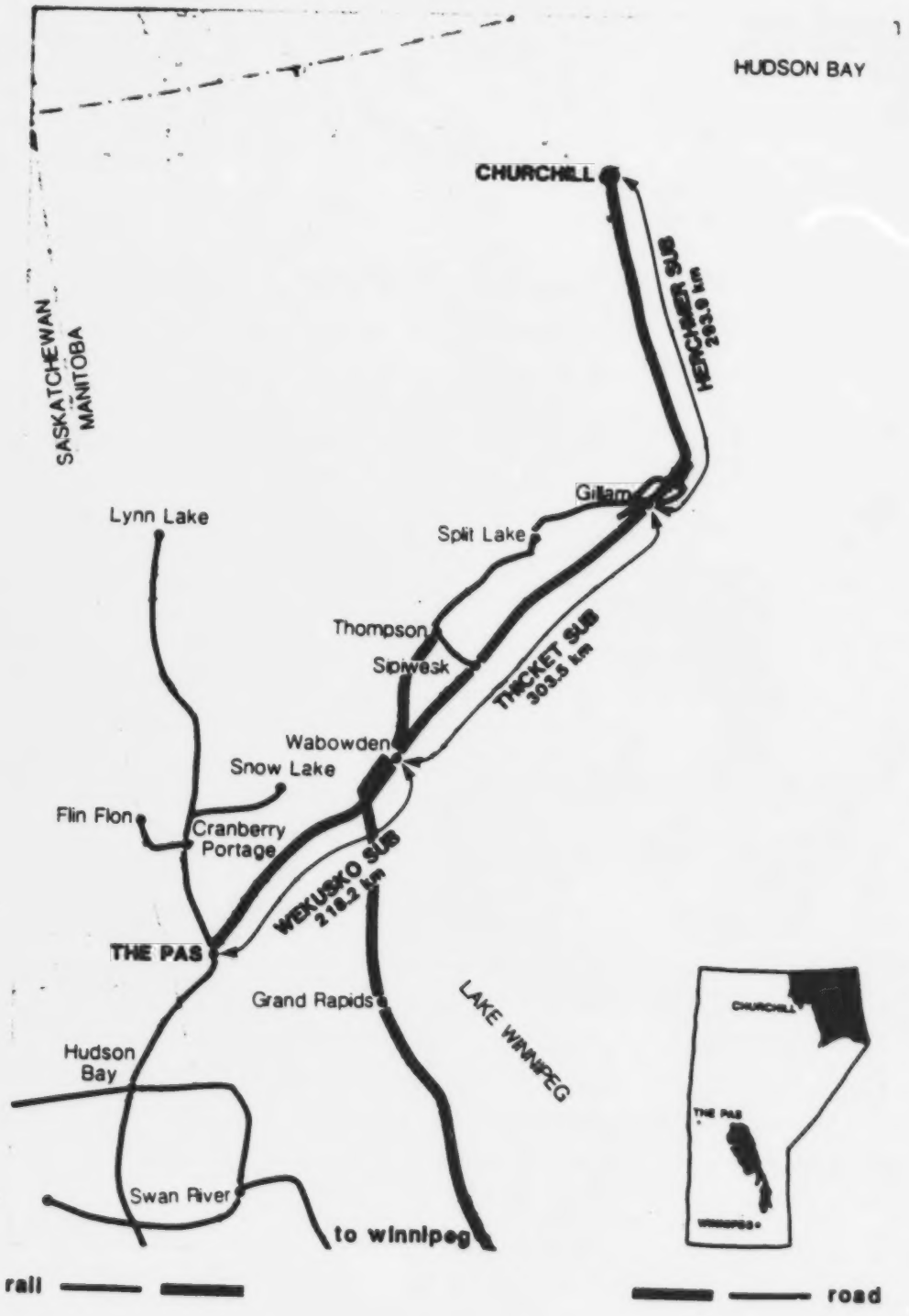
exhibit 2.4C

## SURFACE ACCESS TO CHURCHILL

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The Baffin Island communities are principally served by the Eastern Arctic Sealift operating out of Montreal. The Canadian Coast Guard coordinates this operation. Tenders are called separately for fuel deliveries by tankers and for dry cargo deliveries by Canadian merchant vessels. The Eastern Arctic Sealift vessels deliver dry cargoes to the high water mark and it is the responsibility of the consignee to transfer goods from there to his receiving location.

The Quebec communities on the eastern shore of Hudson Bay are served with dry cargo from Montreal by a Quebec Government Sealift, and by the federal government Eastern Arctic Sealift referred to above; fuel service is provided by Shell Oil Limited. Moosonee Transportation Co. Ltd., offers service primarily to James Bay and adjacent communities. The two Sealifts are supplied by Canadian vessels which bid on contracts tendered for the transport of dry cargo by the Quebec and federal governments respectively.

There are two communities on the Ontario coast of Hudson Bay, Fort Severn and Winisk. The former is currently served by Moosonee Transportation Co. Ltd. and the latter is expected to be served in future by the same company following completion of harbour facility improvements.

Rail and Road Services

Churchill is served by the Hudson Bay Railway, operated by CN Rail. Dry cargo destined for the Keewatin area and shipped by rail originates primarily in Winnipeg and secondarily in Edmonton. Bulk fuel for the Keewatin is supplied from Churchill from storage tanks which are leased to Esso Canada Limited on a five year contract starting in 1984. Fuel is brought by rail to Churchill from points in Saskatchewan served by pipeline.

The major part of the dry cargo shipments through Churchill are handled by or on behalf of three organizations: The Hudson's Bay Company, Arctic Cooperatives Limited and a number of agencies of the Government of

the Northwest Territories. These organizations in turn use the services of three transportation or forwarding organizations: Costa Cartage, Federated Cooperatives, and CN Route Trucking.

The majority of the shipments are consolidated in Winnipeg, normally palletized and shipped north in one of three ways:

- in full boxcar loads, directly from Winnipeg;
- in highway trailers on flatcars by rail directly from Winnipeg; or
- in highway trailers by road to Thompson for transshipment by special piggyback cars to Churchill.

The Port of Moosonee on James Bay is supplied by the Ontario Northland Railway (ONR). Goods for Moosonee are normally shipped by CN Rail or truck from Southern Ontario to Cochrane and then via the ONR to the port

Air Services

Unit toll and charter air resupply services in the study area are provided by seven firms, with head offices as follows:

| | |
|---|---|
| o Keewatin Air | Winnipeg |
| o Nordair | Montreal |
| o First Air | Ottawa |
| o Pacific Western | Calgary |
| o Northwest Territorial Airlines | Yellowknife |
| o Calm Air | Thompson |
| o Kenn Borek Air | Resolute. |

In addition, there are charter operators with licenses to operate at specific airports in the study area:

- Bradley Air Services;
- Nunasi Central Airlines;
- Austin Airways.

The routes served by each of the scheduled carriers are shown in Exhibit 2.6 of the report (following), with further information on air carriers and airports presented in Appendix D.

In addition to their requirements as Arctic communities, the towns of Frobisher, Hall Beach, Cambridge Bay and Resolute have an additional role as points on the DEW Line. Resolute also has a special role, with a military installation and as a destination for organized tourist parties coming in by air.

Marine Resupply Cargoes

The annual tonnage delivered by NTCL to the six communities in Northwestern Hudson Bay has varied between 15,700 and 24,500 tonnes in the eight years, 1978 to 1985, with an average of 21,000 tonnes. Bulk fuels have accounted for between 70 percent and 80 percent of these cargoes, with an average of 73 percent. On average, some 1.3 tonnes per capita of dry cargo and some 3.1 tonnes per capita of bulk fuels are delivered by NTCL; lower amounts per capita to the southern three communities reflect a higher market share by the air resupply mode.

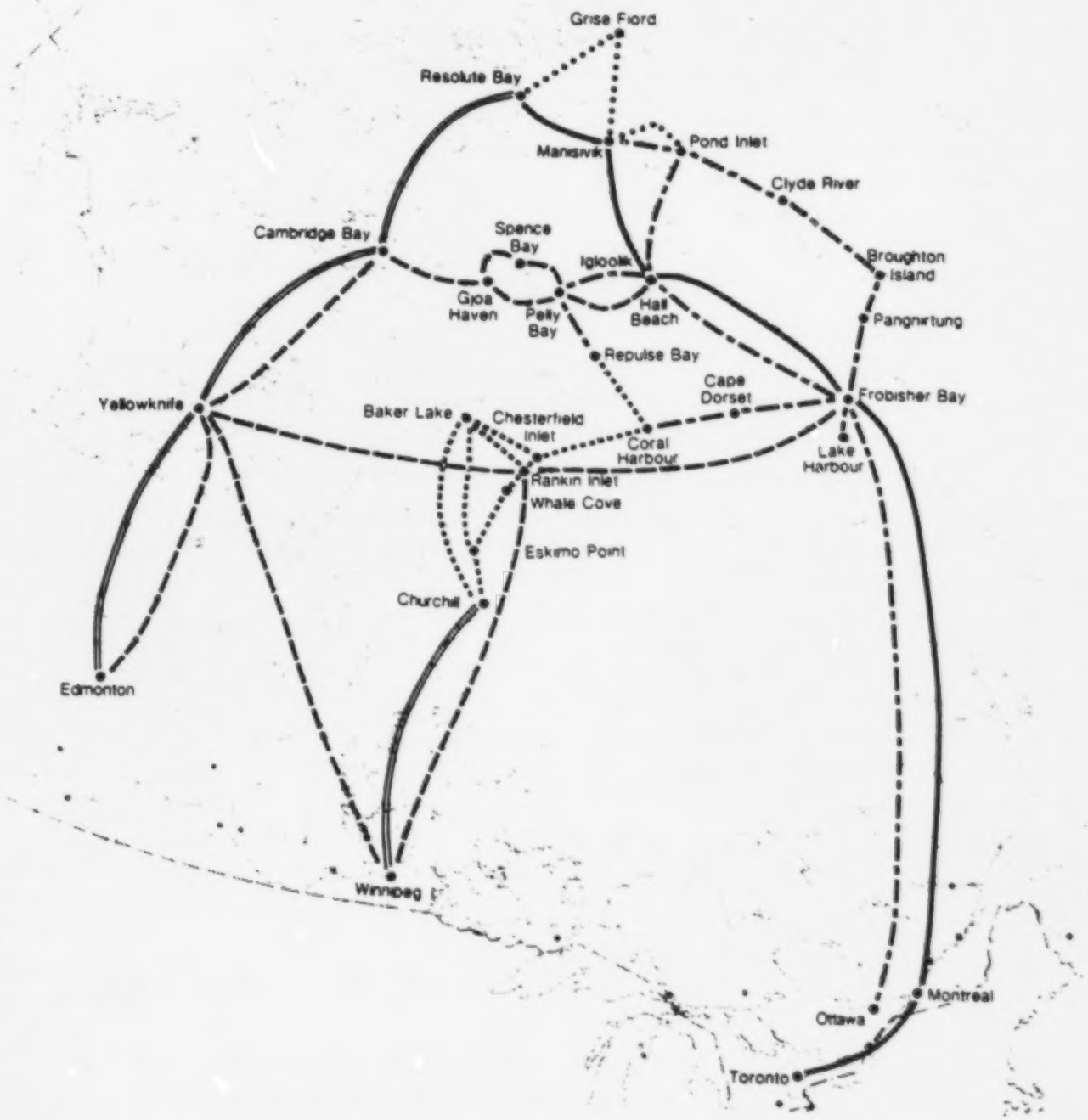
The total tonnage delivered by the Eastern Arctic Sealift in 1984 was approximately 48,000 tonnes, divided into 36,000 tonnes of bulk fuel (75 percent) and 12,000 tonnes of dry cargo. The deliveries of bulk fuel were in the range 4 to 4.5 tonnes per capita and of dry cargo 0.8 to 1.5 tonnes per capita.

Churchill Railway Traffic

CN provides one freight train per week which leaves Winnipeg on Saturdays and arrives in Churchill on Mondays. In addition, a restricted piggyback service is provided three times per week out of Thompson on specially equipped cars attached to the VIA passenger train. The movement of freight (exclusive of grain) while fluctuating significantly from year to year, has exhibited a flat trend during the past decade, averaging

exhibit 2.6 C

## SCHEDULED AIR CARRIER ROUTES




NORDAIR

NORTHWEST TERRITORIAL

CALM AIR

PACIFIC WESTERN

FIRST AIR

KENN BOREK AIR

IBI

close to 40,000 tonnes per year. In recent years it fell from a peak of 56,000 tonnes in 1980 to 30,000 tonnes in 1982, recovering to 56,000 tonnes in 1984. Throughout the period 1975-1984, bulk petroleum product shipments averaged 28,000 tonnes per year, ranging from a low of 15,000 tonnes in 1978 to a high of 44,000 tonnes in 1984. The shipments of both dry goods and bulk fluids represent requirements both for the local Churchill market and for Arctic resupply.

Air Resupply

As shown in Exhibit 2.12 of the report, the air mode's share of resupply traffic was estimated at about 48 percent of the total dry cargo in 1979 and 1980, rising to about 66 percent in 1982 and 1983 and falling again to about 38 percent in 1984 and 55 percent in 1985, based on government policy initiatives in 1984 to increase marine shipments. The total demand for dry cargo in the Keewatin by marine and air services combined is approximately 3 tonnes per capita.

Traffic Projections

Based on past trends and future expectations regarding natural increase and immigration, the base line forecast of population represents a growth rate of about 2.7 percent per annum over the 1984-1989 period and about 2.3 percent per annum over the 20 year period 1984-2004 in the study area. Using the values of 3.9 to 4.5 tonnes per capita for bulk fuel and 3 tonnes per capita for the dry cargo (with a 50/50 marine/air modal split) the total resupply cargo demand in the Keewatin area is estimated at about 27,000 tonnes by 1989 and about 30,500 tonnes by 1994, about 25 percent above the 1984 level.

If the NTCL territory were expanded to include Foxe Basin, Hudson Strait and/or the east side of Hudson Bay, the total estimated tonnages in 1989 and 2004 would be:

| | 1989 | 2004 |
|---|---|---|
| Keewatin plus Foxe Basin | 36,800 | 41,800 |
| Keewatin plus Hudson Strait | 34,000 | 38,600 |
| Keewatin plus the east side | 77,600 | 88,000 |

## 3. MARINE AND RAIL RESUPPLY

Chapter 3 of the report describes the component costs of transportation of goods from origin to destination on a comparable basis and presents an evaluation of opportunities to route more marine traffic through Churchill, either by extending NTCL services or by making it attractive for vessels presently operating from Montreal to use Churchill for some of their deliveries. The chapter concludes with a summary of opportunities which appear to offer the possibility of cost-effective marine routings through Churchill for shippers under certain conditions. A lower cost road/rail link from Winnipeg to Churchill is a key component in inducing additional traffic and it is discussed. The opportunities are evaluated in more detail in Chapter 5.

### Transportation Rates

Marine transportation rates quoted by NTCL or by the Eastern Arctic Sealift differ in three different respects:

- NTCL charges firm rates negotiated year-by-year with Transport Canada while Sealift rates are tendered each year and are more variable and unpredictable;
- NTCL charges for dry cargo primarily by weight but the Sealift charges by a combination of weight and volume measurement; and
- NTCL delivers dry goods to the consignee's location whereas the Sealift delivers to the high water mark.

NTCL marine rates are $116 per tonne for bulk fuel, $399 per tonne for dry cargo and $187 per tonne for 75 percent bulk and 25 percent dry cargo. The Eastern Arctic Sealift rates range between $80 per tonne

and $116 per tonne for bulk fuel, between $381 and $587 per tonne for dry cargo, and $155-$229 per tonne for 75 percent bulk fuel plus 25 percent dry cargo. NTCL rates would be about $24 per tonne less than Sealift rates to the Foxe Basin but are about $32 per tonne more than the Sealift rates to Hudson Strait.

It should be noted that the rates do not fully repay costs in either service. NTCL receives a subsidy which varies from year-to-year and in the period 1978-1982 averaged about 20 percent of revenues. The Sealift is not formally subsidized but the consignees pay only the direct shipping cost with no allowance for the administration costs of the Canadian Coast Guard; this could amount to 10 percent-20 percent of system costs.

The rail rate from Winnipeg to Churchill for general merchandise is $123 per tonne ($5.60 per 100 lbs.), if shipped in a boxcar with an 18.5 tonne (40,000 lbs.) minimum weight. The cost for less than carload quantities is $212 per tonne ($9.60 per 100 lbs.). There is a proposal to consolidate shipments in Winnipeg (by resupply port destination), take the containers by truck to Thompson, Manitoba and then by rail flatcar to Churchill, where they would be loaded directly onto the NTCL barge. The proposed charge would be $123 per tonne ($5.60 per 100 lbs.) for this service, which is presently in the discussion stage.

Dry cargo shipments from Toronto to Moosonee move at $132.70 per tonne in 40,000 lb. carload quantities.

Bulk fuel is shipped part way (e.g. to Regina) by pipeline and then by rail to Churchill at an estimated charge for the rail segment of about $82 per tonne. The cost to ship crude oil from Edmonton to Montreal by pipeline, however, is only $3 per tonne. Montreal therefore starts with a differential advantage of about $79 per tonne in comparison with Churchill. Because of some absorption of transport costs by the oil company, this difference, in practice, is about $68 per tonne. Since NTCL charges $116 per tonne for bulk fuel delivery from Churchill to the Keewatin ports, a customer would be able to obtain his fuel more cheaply

from Montreal provided the Sealift cost were less than $184 per tonne. As noted earlier, however, Sealift costs are everywhere less than $116 per tonne. This leads to the conclusion that Churchill is uncompetitive with Montreal as a source for Arctic resupply of bulk fuels unless Churchill can obtain fuel stocks by ocean tanker (as discussed in a later section).

Expansion of NTCL Services

Section 3.2 of the report examines the operational feasibility of expanding the NTCL resupply services into, respectively, Foxe Basin, Eastern Hudson Strait, the east side of Hudson Bay, and the Ontario coast south of Churchill. It is concluded that expanding NTCL's service into Foxe Basin would require lengthening its shipping season at Churchill to November 13 using present operational methods and to October 23 through streamlined loading/unloading operations with containers. The normal NTCL season is 81 days, from July 17 to October 4, although the firm is prepared to operate until October 15 if cargoes are available, so the required season extension would be a further eight days. If the service were expanded to include Eastern Hudson Strait (not including Foxe Basin) the season at Churchill would have to be extended to October 30 using present methods or to October 10 using streamlined methods. If an attempt were made to serve Keewatin together with both Foxe Basin and Hudson Strait, then even with reduced loading and unloading time the season would be 40 days longer than at present, implying a normal season completion on November 13.

If Sanikiluaq (on the Belcher Islands in Southeast Hudson Bay) were added by itself, the operation could be included within NTCL's present planned season closure of October 15. If Foxe Basin, Hudson Strait and Sanikiluaq were all added with no change in practice, the required season length would be 163 days (compared to the present NTCL season of 81 days) which would be impractical. This could be reduced by buying an additional tug and the associated barges, but the cost of this would be prohibitive in comparison with Montreal-based service unless the equipment could be used effectively elsewhere during the Churchill off

season. NTCL's existing tug has to restrict its territory to appropriate waters since, if the vessel were locked in ice for any significant period of time or if it were damaged, it would jeopardize the supply of materials to the basic Keewatin ports. For this reason, it is considered by the NTCL and the study team that Foxe Basin is not a suitable destination to be served by NTCL unless suitable additional marine equipment were to be provided.

The price of oil in Churchill is $68 per tonne higher than it is in Montreal, as noted earlier. Dry cargo tariffs from Winnipeg to Churchill are $123 per tonne in carload quantities. If NTCL could absorb these additional costs, it would be in a good position to compete in adjacent Sealift ports. The feasibility of this was examined in terms of cargo for Cape Dorset and Lake Harbour in Hudson Strait.

It was found that NTCL's marginal costs for the two trips to Cape Dorset and Lake Harbour would be sufficiently small that they could absorb the additional cost of oil in Churchill and the cost of transporting dry cargo from Winnipeg to Churchill, and therefore be able to deliver these cargoes at the two Arctic ports at a cost lower than those associated with the Eastern Arctic Sealift. It appears to be economic, therefore to expand NTCL's territory to include the eastern end of Hudson Strait, despite the higher cost of supplies in Churchill, but a mechanism would have to be found to make the service attractive to Cape Dorset and Lake Harbour residents (e.g. by marginal pricing). A similar conclusion is reached regarding the Port of Sanikiluaq.

### Use of Churchill by Sealift or Other Resupply Vessels

The Sealift organizes its bulk fuel deliveries in tankers and its dry cargoes in contracted Canadian vessels. Either of these types of vessels could, after delivering a load to one Arctic region (such as Hudson Strait) proceed to Churchill for reloading and deliver a subsequent cargo to another region (such as Foxe Basin). The Hudson's Bay Company

are also interested in operating their own and chartered vehicles in such a fashion. An economic assessment of this mode of operation was carried out.

If a tanker were to service the ports of Eastern Hudson Strait, for example, and then reload at Churchill to serve Foxe Basin destinations, it would save 12 days in comparison with a return round trip to Montreal. These 12 days would cost $250,000 or $35 per tonne; since fuel is $68 per tonne more expensive in Churchill than in Montreal, it is not economical to use Churchill at current prices. For Churchill fuel to be competitive it would be necessary to find an off-shore supplier who would be prepared to deliver refined product to Churchill in relatively small quantities (17,000 tonnes per year maximum) for a total price not more than $35 per tonne above the Montreal price. Esso have indicated that they would not be interested in such an operation.

Similarly, if dry cargo vessels were to use Churchill to reload after delivering their first Sealift cargo, they would each save 12 days of sailing time or about $84,000 in comparison with returning to Montreal. Since the additional cost of transporting dry cargo from Winnipeg to Churchill is at least $123 per tonne, the dry cargo vessel would make a net saving by using Churchill if the volumes to be loaded there were less than 680 tonnes; above this value it would be worth returning to Montreal. In 1984 the average size of Sealift cargoes was approximately 1,000 tonnes, so that this opportunity does not appear economic for most vessels. However, if the shipping cost from Winnipeg to Churchill were sufficiently reduced, the opportunity could become economic. This possibility would be enhanced if Sealift vessel costs were to increase above the current level of $7,000 per day. Both the Hudson's Bay Company and Arctic Cooperatives Limited have indicated an interest in shipping in such a way particularly since there are further advantages to them in using traditional suppliers in Western Canada. Moreover, the Hudson's Bay Company could make an additional trip with their own vessel in each season and thereby reduce their need for chartering. A rate of about $80 to $90 per tonne for cargo from Winnipeg to Churchill would make Churchill attractive to them, as illustrated in Exhibit 3.1 of the report (following).

Conclusions on Marine Traffic

It is concluded that the most promising opportunity to extend NTCL services would be to serve Cape Dorset and Coral Harbour in Hudson Strait and possibly Sanikiluaq in the Belcher Islands. This additional tonnage could be handled with the existing equipment and crews and with a marginal extension of the shipping season if measures are taken to increase the productivity of the marine fleet. Among the latter would be the use of a dock at Rankin Inlet and the use of local resources to move cargo from the high water mark at major locations. NTCL would have to be permitted to charge lower rates based on marginal costing to permit the newly served communities to achieve the same landed cost of goods, particularly bulk fuel, as they do at present.

If a reduced cost of land transportation from Winnipeg to Churchill (e.g. to about $80-$90 per tonne) could be negotiated, it would be economically attractive for Sealift vessels and/or vessels of the Hudson's Bay Company based in Montreal to make two or three trips each to Churchill to take on resupply cargoes, before returning to Montreal at the end of the season. If such vessels were to make three visits each to Churchill in a single shipping season, approximately 10,000 additional tonnes of dry cargo would be supplied through Churchill in 1986 increasing to approximately 11,400 tonnes by 1989 and 15,000 tonnes by the end of the century based on projected population growth.

Finally, if NTCL were permitted to charge a sliding scale based on distance so that the marine/air rate ratio to south Keewatin destinations equals that in the north, the marine tonnes per capita in the south would be expected to rise to about 1.5. This would lead to a diversion of approximately 1,000 tonnes from air to marine. This increase would not require an additional trip to the Southern Keewatin communities and so would improve the productivity and cost recovery of the NTCL operation.

### A Lower Cost Land Link From Winnipeg to Churchill

A lower cost land link from Winnipeg to Churchill would require the introduction of a piggyback trailer service. This is not in accord with the normal policy of CN which is to encourage piggyback transportation between major centres only. However, if significant new cargoes via Churchill can be developed by reorganizing the Eastern Arctic Sealift to deliver cargoes out of Churchill and if understandings can be reached with the Hudson's Bay Company and Arctic Cooperatives Limited to ship via Churchill (as they are interested in doing) assuming an appropriate rail service and rate, then the volumes could perhaps induce the railway to provide the service. Comparisons with piggyback rates charged by B.C. Rail to northern communities suggest that an all rail service from Winnipeg to Churchill or a road/rail service by road to Thompson and onward by rail, could be economically viable at about $90 per tonne. An Eastern Arctic Sealift review in fiscal 1985/86 is considering the possibility of the Nunasi Corporation operating the Sealift from fiscal 1987/88 onwards. This offers the opportunity to consider the inclusion of Churchill routings in the Sealift process and to negotiate appropriate rates for these cargoes on the railway.

## 4. AIR RESUPPLY

Chapter 4 of the report discusses the rates and level of service between communities in the study area and Edmonton, Winnipeg and Montreal. It then discusses opportunities for expanding air service north into the study area from Winnipeg and Churchill.

### Passenger Services

Fares generally are from $0.30 to $0.50 per nautical mile along the main air routes between major centres (such as Edmonton-Yellowknife or Montreal-Frobisher) rising to $0.80 to $1.40 per nautical mile at the periphery (e.g. Frobisher to Broughton Island or Cambridge to Gjoa Haven). The lack of a connection by an integrated system north from

Winnipeg means that fares in this corridor are the sum of a number of route segments, with no fare tapering at longer distances, leading to relatively high prices and a low level of service. Hall Beach to Churchill is 46 percent of the distance of Hall Beach to Montreal, yet the air trip costs 22 percent more and requires an overnight stop in Rankin Inlet. A round trip to Churchill from Hall Beach takes a week, compared with four days to Montreal.

Air Cargo Services

It is evident that, although Foxe Basin and central Baffin communities are nearer to Winnipeg than to Montreal or Edmonton, the present air route structures make it easier for services to be provided via Montreal. For Manitoba to obtain a share of the Arctic resupply traffic, it requires an integrated air service along an axis of Winnipeg-Churchill-Rankin Inlet-Hall Beach-Nanisivik-Resolute*. Communities along this axis are nearer to Winnipeg than to any other major metropolitan area. If an improved land link service can be arranged between Winnipeg and Churchill as described earlier, the study area communities would be served more cost-effectively from Churchill, as a source where freight can be readily and quickly available, than from any other comparable source in Canada.

While some air freight service requires immediate delivery by the next available flight, the prime choice in the Arctic communities is between once a year marine service or the alternative air service. In such a choice, the option of overland from Winnipeg to Churchill followed by air service may well provide a fully adequate level of service while being significantly less expensive than supply by air over the entire route.

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* This service pattern was operated by Transair during the mid-1070's but was discontinued by its successor PWA in 1978 primarily due to weather delays. PWA currently operate an all cargo service from Winnipeg to the DEW Line Base at Hall Beach.

Conclusions on Air Traffic

Two options were considered: one the extension of the existing corridor from Rankin Inlet to Hall Beach and the second a further extension to Nanisivik/Resolute. Since Winnipeg does not have a significant advantage in terms of distance over Montreal and Edmonton in the corridor north of Hall Beach, and high quality service already exists there, it is unlikely that direct service from Winnipeg to points north of Hall Beach would be viable in the short term.

Traffic demand at Hall Beach might support a once weekly Winnipeg/Churchill orientated service by a 100 passenger aircraft operated in a combined passenger cargo configuration (also referred to as a "combie"). The present NWT service to Rankin Inlet operates twice weekly but overflies Churchill. The recommended corridor solution would be a direct combie service linking Winnipeg, Churchill, Rankin Inlet and Hall Beach. The practicability of this recommendation should be confirmed through a detailed analysis, necessary data for which was not available at the time of this study.

Both PWA and NWT have the capability to provide the suggested service. The NWT fleet consists of aging L-188's which could provide a short term solution but which would have to be replaced. They are also slow, considering the long distance involved. PWA operate a convertible B737 jet aircraft on passenger service from Winnipeg to Churchill and a DEW Line cargo service from Winnipeg to Hall Beach. Assuming adequate load factors, this aircraft would be better suited to the route but for efficient operation would require that the runways at Rankin Inlet be extended by approximately 500 feet to 5,500 feet. A precision approach instrument landing system would also be desirable. Hall Beach already has a 5,400 feet runway.

If Churchill is to maintain and expand its role as an air resupply centre for the Arctic, however, positive steps must be taken to ensure that goods and services required by inhabitants of northern

communities can be obtained there at prices competitive with those farther to the south, allowing for the extra transportation costs from Winnipeg or Thompson. As discussed more fully in the body of the report, this means that:

1. Lower road/rail rates must be negotiated for moving dry goods to Churchill;

2. Service improvements are required to reduce trans-shipment loss/damage; and

3. Institutional changes are needed so that surface/air resupply services through Churchill can be arranged through one agency.

If these changes are not made soon, there is a strong likelihood that air resupply services will be provided increasingly from communities farther south and Churchill's role will be increasingly eroded.

## 5. OPERATIONS AND INFRASTRUCTURE

Chapter 5 of the report, with supporting data in Appendices A, B and D, discusses the physical requirements at Churchill and the northern communities for the types of changed resupply operations proposed in this study.

It is concluded that the proposed use of Churchill as a secondary resupply base by Sealift vessels could be accommodated in terms of berthing and open storage space but that the Sealift or its customers or agents would have to make arrangements for covered storage facilities outside the Port area. Existing marine facilities at the six Keewatin ports are adequate for continuing NTCL resupply operations, although some improvement to the wharf at Rankin Inlet could be economically justified in terms of reduced unloading times.

Airside facilities at Churchill Airport are adequate for the proposed air resupply role but cargo handling facilities would have to be improved by the carriers. Passenger terminal improvements are desirable

and we understand that a new facility is planned to be built in 1987/88 under the Churchill Sub-agreement. Airport improvements at the relevant Arctic communities would not be required although an Instrument Landing System would be desirable at Rankin Inlet in view of its role as an air hub in the region and as an alternate to other airports in the vicinity.

## 6. EVALUATION AND CONCLUSIONS

Chapter 6 of the report summarizes the opportunities identified in previous chapters and evaluates the implications of implementing them and their sensitivity to various factors which might change the conclusions. It then discusses possible mechanisms and strategies for implementing the most viable opportunities.

The expansion of NTCL territory brings both additional dry cargo and bulk fuel shipments through the Port of Churchill whereas attracting Sealift vessels brings only dry cargo shipments. From this point of view, therefore, the expansion of NTCL would be a marginally preferred option.

However, resupply by the Sealift vessels would increase the area that would be served from Churchill, dramatically increasing its role as an Arctic resupply centre to the benefit of both the Northern and Western economies. It would also allow Montreal cargoes to the NTCL points to be transshipped through Port Churchill to the benefit of Eastern Canadian suppliers.

The NTCL expansion option is probably more vulnerable in the longer term since fuel costs are higher in Churchill than in Montreal and, if world oil prices continue to drop, there may be increasing pressure to supply the Keewatin with fuel from Montreal. Since bulk fuel provides 73 percent of NTCL's cargo and almost 40 percent of its cargo revenue, it would be doubtful that NTCL could continue to operate delivering dry cargo

alone under these circumstances*. Attraction of existing Sealift traffic to Churchill by having Sealift or Hudson's Bay Company vessels make two or three interim trips to Churchill for resupply cargoes before returning to Montreal would establish a mechanism for Keewatin dry cargo service to be maintained from Churchill should bulk fuel be supplied from Montreal and NTCL's service as presently constituted cease. As NTCL's traffic volumes increase with population growth, its surplus capacity necessary to add new areas will diminish. The additional Hudson Strait volumes amount to 25 percent of existing demand and correspond to nine years of growth from 1984 levels at the "base line" growth rate. As noted earlier, for NTCL to accommodate Hudson Strait traffic it would be desirable for NTCL to achieve significant productivity increases in operation through possible wharf construction and the use of local delivery personnel. For the above reasons, it is concluded that expansion of NTCL services offers less scope for expansion of Churchill resupply than would the attraction of Sealift vessels to Churchill. The two options could well prove compatible.

An NTCL distance-based tariff (lower in the south and higher in the north) could divert 1,000 tonnes annually from air to marine to the south Keewatin. This diversion, if achieved, would result in lower costs to the Keewatin as a whole, since NTCL revenues would increase by a lesser amount than air revenues would decrease. The option is therefore recommended. The new scale will need to be negotiated between NTCL and Transport Canada and included in the agreement between them. For evaluation purposes, this increase to NTCL is estimated to reduce unit toll and charter air cargo volumes by 500 tonnes each.

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* However, if a cheaper off-shore source of fuel for Churchill resupply could be found, or if NTCL were to restructure its operations to make more effective year round use of existing or possibly new equipment, if might well provide a service that would be competitive with Sealift vessels (assuming lower railway freight rates).

a The tonnages of dry cargo to be shipped on surface routes to Churchill for the recommended options are estimated to be as follows by 1989:

| | |
|---|---|
| Existing Churchill Supply | 3,400 tonnes |
| Existing NTCL Service | 8,500 tonnes |
| Existing Air Cargo | 10,800 tonnes |
| Attraction of Montreal-based vessels | 11,500 tonnes |
| Additional Air cargo | 2,900 tonnes |
| TOTAL | 37,100 tonnes* |

In terms of 13.7 m (45 ft.) trailers, carrying average loads of 20 tonnes each, the 1989 volume would be equivalent to 1,850 trailers per year. Of these, 1,160 would be over the 13 week marine shipping season while 690 would be spread over 12 months. In peak weeks, therefore, the demand could be for the equivalent of 100 trailers per week. Some of the freight would, of course, be shipped in boxcars rather than trailers. These volumes appear high enough to be of interest to the railway and could possibly justify a higher frequency service than the present tri-weekly one.

Sensitivity to Outside Factors

The tonnage estimates are sensitive to a number of factors of which the most important are:

- o attainment of the base line forecasts;
- o growth of cargo demand in proportion to population growth;
- o maintenance of the approximate 50/50 modal split between marine and air cargo; and
- o the continued price differential between Churchill and Montreal bulk fuel prices.

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* Basis 1984 actual volumes expanded to 1989 assuming a 2.7 percent annual growth rate in accordance with projected population growth.

The base line forecast assumes continuing population growth based on natural increase but no net immigration. This is conservative in that net immigration could occur if there were renewed mining activity or oil exploration in the resupply area while net out-migration is unlikely based on past experience. It is therefore more likely that demands arising from this factor will increase rather than decrease in which case the base line forecast would be exceeded.

The resupply cargo estimates assume that per capita demand for bulk fuel and dry cargo will remain constant, such that cargo growth will be proportional to population. It is possible that there will be further conservation in fuel consumption per capita, reducing the estimated demand, but there is no obvious factor which would lessen per capita demand for dry cargo. Significant reductions in per capita fuel consumption (e.g. by more than 5 percent or 10 percent) are considered very unlikely since high oil prices have already resulted in conservation measures; indeed recent decreases in world oil prices, if sustained, could restrain price increases during the next five or ten years suggesting that it would be more likely for per capita fuel consumption to increase rather than decrease in the short term.

The air mode had been gaining an increasing share of the resupply market until the NWT Government effort restored the marine share in 1984 and 1985. It is possible that the air resupply share might increase in future as larger more efficient aircraft are introduced. In this case the air resupply volumes would increase above those projected and the marine resupply volumes would be correspondingly reduced. It is therefore important from a strategic point of view to ensure the competitiveness of both the air and marine modes through Churchill, so as to retain traffic for the community and for Manitoba regardless of resupply mode. Attractive rates on the Churchill railway are the key factor in achieving this objective.

The disadvantage of Churchill as a bulk fuel resupply port lies in its high cost of supply by rail. Before 1974, oil was supplied by tanker from off-shore refineries. The study has not identified a potential off-shore supplier who would be interested in supplying Churchill at a price equal to or marginally above the Montreal price. However, the oil market is at present very volatile and the opportunity for off-shore oil supply could arise again. The oil resupply market in Hudson Bay and Hudson Strait (amounting to about 75,000 tonnes of fuel in 1989) could then be an economically viable commodity movement for Churchill.

Mechanisms and Strategies for Implementation

To achieve the increased flow of marine resupply cargoes through Churchill in accordance with the economic opportunities described earlier, three developments would have to occur simultaneously:

- the three major shippers would have to indicate the volume of cargo that they would be prepared to commit for transport via Churchill;
- the railway would have to offer a lower cost freight service from Winnipeg to Churchill;
- the split between Churchill and Montreal cargoes would have to be determined between NTCL and Sealift vessels at Churchill.

A procedure would have to be developed for calling of tenders and awarding of contracts for resupply from both Montreal and Churchill. Minimum cargoes would have to be guaranteed by the three major shippers for each service. This allocation would also have to take into account the desirability of expanding the NTCL barge service from Churchill. Initially this would be a very complex process but once it was established, the marketing preferences of the shippers would determine the preferred cargo allocations.

The Sealift ordering and resupply process is a cooperative one coordinated by the Canadian Coast Guard. It has been proposed that the Government of the Northwest Territories might set up a development agency to take over the coordination function from the Coast Guard in fiscal year 1987/88. It may be appropriate for the Province of Manitoba to become associated with the Eastern Arctic Sealift coordination function, since it is in Manitoba's interest to encourage the use of goods produced in Winnipeg for Arctic resupply. Possibly a joint NWT/Manitoba agency could coordinate the Manitoba related Sealift function.

To achieve the lower cost rail link from Winnipeg to Churchill, the railway would have to offer a service designed for the higher volumes. Given the fact of only once a week freight service from Winnipeg, the Winnipeg-Thompson road link plus a transfer of trailers onto cars designed to receive trailers easily for shipment with the passenger trains appears to be the practical solution. At Churchill the trailers would either be transferred to the vessels direct (as desired by some of the shippers), off-loaded for transshipment in consolidated form, or driven to the airport for air cargo resupply.

It may be that the railway will require some guarantee of minimum annual volumes to make the necessary service commitments and to introduce a new rate. Such guarantees may be able to be given by the principal shippers for the NTCL and Sealift cargoes and the Province of Manitoba for the Town of Churchill known minimum requirements. The Hudson's Bay Company and Arctic Cooperatives Limited have indicated a strong interest in shipping through Churchill. These shippers could well be included in the Sealift coordination function. They may be willing to give commitments on quantities to be shipped as part of any rail rate guarantee that may be required.

The air corridor north from Rankin Inlet has relatively low passenger demand and the extended service would also be in competition with Nordair out of Montreal. The presence of air cargo via Churchill would therefore be a significant factor in providing revenue to support

the proposed route extension to Hall Beach. Extension of the Winnipeg North air link would thus logically follow the establishment of a reliable higher volume, lower cost land link based on marine cargoes; the potential for a more uniform year round demand for air cargo volume could be a factor justifying lower rail tariffs.

For the air cargo service to be more effective, a single agency should coordinate all stages of the movement. In this way a customer could deal with a single agency when making a shipment and this agency would be responsible for ensuring delivery. This coordination function could be provided by a freight forwarder, by the airline in cooperation with the railway, or by an agency established by the Province of Manitoba or the Northwest Territorial Government or both.

It is not evident at this stage which airline, if any, could best provide the proposed service. Pacific Western operates the Winnipeg-Churchill link and serves Resolute from Edmonton and Cambridge Bay. Northwest Territorial operates the Winnipeg-Rankin Inlet link and serves Hall Beach also from Edmonton and Cambridge Bay. The Winnipeg North link would therefore compete with the existing service of these carriers from Edmonton and the west. However these airlines with their western bases appear to be logical contenders for the route. Calm Air, headquartered in Thompson and serving the Keewatin, would be an alternative but it would face competition from Pacific Western on the Winnipeg-Churchill leg and from Northwest Territorial on the Winnipeg-Rankin Inlet leg, which would pit a small airline against two larger ones on the highest volume sector of the route.

It is proposed that discussions with Pacific Western Airlines and with Northwest Territorial be the first step in the establishment of the proposed Winnipeg North air route and that such discussions be held after the prospects for a restructured Sealift and Churchill resupply land link have been clarified, but not necessarily finalized.

Summary: Proposed Action Plan

Based on the above conclusions and recommended strategies for preserving and expanding rail, marine and air resupply operations through Churchill, the following action plan is proposed:

1. The proposed integration of the Churchill and Eastern Sealift operations will require an expansion of the coordination function currently performed by the Canadian Coast Guard to include marine shipments from Port Churchill. Also some form of coordination will be necessary on the land link to Churchill for marine resupply cargoes, and the complete service for air resupply. Some of the considerations involved affect areas well beyond the study area boundary. The three groups who have the broadest interest and responsibility are the Northwest Territorial Government, various branches and agencies of the federal government and the shippers. The Manitoba Government, CN, NTCL, the air carriers and the marine shipping companies have a direct interest in more limited areas. It appears therefore that the lead role in the restructuring of the resupply system should be taken by the Northwest Territorial Government with the support of the federal government in consultation with the shippers and various agencies and organizations having areas of specific interest.

2. The Government of the Northwest Territories in consultation with the major shippers and the Government of Manitoba should discuss with the Canadian Coast Guard and the feasibility of a combined Sealift operation whereby some Eastern Arctic Sealift vessels, having delivered their initial load of cargo from Montreal, would make interim calls at Churchill to pick up new supplies for Arctic communities rather than returning directly to Montreal. Under this arrangement, a vessel would leave Montreal, deliver its first cargoes (for example to communities in Arctic Quebec and Hudson Strait), pick up new supplies at Churchill and resupply another set of Arctic communities, repeat this sequence a second and possibly a third time, and then proceed back to Montreal at the end of the season. The sailing time and costs saved by using Churchill as a secondary base in this manner would offset the additional price of commodities at Churchill, provided that reduced rail and truck rates

could be negotiated (based on the increased volumes) in line with similar rail/truck rates offered on northern routes in other parts of Canada. The objective of these discussions would be to achieve an agreement by the Canadian Coast Guard and the users of the Sealift service to use Churchill as a secondary resupply base in this manner provided that appropriate rail and road rates from Winnipeg to Churchill can be achieved.

3. the Northwest Territorial Government, again in consultation with the Manitoba Government and the major shippers, should discuss with NTCL and the Canadian Coast Guard the practicability of expanding the NTCL services within Hudson Bay and Hudson Strait. The objective of these discussions would be to determine the volume of additional cargoes that might be transported through Churchill. Depending upon the outcome of Step 2, Step 3 may or may not be relevant. For example, if only dry cargo is to be delivered to the proposed extended NTCL area, then NTCL would not be competitive. However, as a general policy and other factors being equal, the expansion of NTCL services should be encouraged over expansion of Sealift activities because the Corporation is locally owned, and it should be the policy of the Northwest Territorial Government to encourage local initiative, whenever it is feasible to do so.

4. In parallel with Steps 2 and 3, the NWT government with the support of the Manitoba Government and Transport Canada should enter into negotiations with CN and appropriate trucking firms with the objective of achieving increased service and reduced rates overland from Winnipeg to Churchill, reflecting the increased volumes achievable from Steps 2 and 3 and from increased air resupply activities through Churchill (see Step 6 below). It may be that guarantees of minimum annual volumes will have to be made as part of these negotiations.

5. The Government of the Northwest Territories should enter into negotiations with the Hudson's Bay Company and Arctic Cooperatives Limited regarding these companies' commitments on quantities to be shipped as part of any rail or marine rate guarantees that may be required.

6. The Government of the Northwest Territories, with the support of Transport Canada, should confirm the desirability of deregulating the Winnipeg/Churchill/Rankin Inlet/Hall Beach corridor or formulate some other mechanism for increasing competition and

improving the level of service over that currently prevailing. This assessment would include possibly redefining the unit toll role of the local carriers such as Calm Air and Keewatin Air. The practicability of allocating a guaranteed proportion of the forwarded cargo to interested carriers through a tendering process should also be assessed.

7. The feasibility of contracting out the coordination of road/rail shipments to both the air and marine modes to a single private operator should also be examined. The operator could also be either a private consortium or a private/public consortium with the Government of the Northwest Territories in consultation with the Manitoba Government providing the policy framework and information support.

8. NTCL and Transport Canada should enter into negotiations with NTCL to achieve a distance-based resupply tariff to compete with air tariffs. This tariff should provide lower marine rates to the South Keewatin communities and higher marine rates to those in the North Keewatin. It would result in lower resupply costs to the Keewatin as a whole since NTCL revenues would remain the same in total but air revenues would be reduced reflecting a shift from air to marine resupply of South Keewatin communities.

9. The longer term future of the NTCL operation is linked to the finding of a cheaper source of fuel at Churchill than the Western Canadian refineries currently supplying the Port by rail. The practicability of renewing off-shore imports, as was practised until the late 1970's, should be examined.

If the recommended action plan is followed and achieved there would be a number of benefits to the economies of the study area, Manitoba, Winnipeg and Churchill resulting from the additional tonnages of dry cargo for Arctic resupply to be shipped through Churchill. These would amount to an estimated 12,500 tonnes of marine and air traffic per year based on 1984 volumes (10,000 tonnes through the proposed use of Churchill as a secondary resupply base for Montreal based vessels and 2,500 tonnes of additional air cargo carried by the expanded Winnipeg North air service). This would increase to approximately 14,300 tonnes by 1989 based on the projected population growth rate of 2.7 percent per annum. When added to the existing (1984) NTCL volume of 7,400 tonnes of

dry cargo carried by NTCL, the existing 9,000 tonnes of air cargo moving through Churchill and the existing Churchill supply by rail of about 3,000 tonnes (19,400 tonnes in total), this produces a total estimated 1984 volume of about 62,400 tonnes per year, including bulk fuel over the Winnipeg/Churchill rail link.

The recommended action plan, if achieved, would lead to marginal increases in jobs and income in Manitoba (about 250 jobs and $4.5 million in labour income) which would be largely offset by similar decreases of jobs and income in the Montreal and Edmonton regions. More importantly, the new services would produce a net reduction in both marine and air resupply rates to most Arctic communities in the study area. Substantially improved air services for resupply cargoes (and for passenger services if a combined cargo/passenger service is provided) would also be achieved in the corridor north of Churchill, serving Rankin Inlet, Hall Beach, Nanisivik and Resolute. The affected communities north of Churchill would experience a substantial increase in convenience and reduction in cost for air service to the nearest communities lying south of them, e.g. Churchill and Winnipeg. A related, less tangible benefit would be a strengthening of the resupply role of Churchill and therefore of its viability as a strategic centre to help achieve other sovereignty, defence and economic objectives in Canada's North.

# PORT OF CHURCHILL ADDITIONAL COMMODITIES

## STUDY B

## EXECUTIVE SUMMARY

### 1. STUDY OBJECTIVE AND SCOPE

This study was conducted on behalf of the Government of Canada, Transport Canada, and the Government of Manitoba, Department of Highways and Transportation, under the Canada-Manitoba Subsidiary Agreement on Churchill. It is part of an overall study of the Port of Churchill conducted on an integrated basis by IBI Group and its associated consultants, with the following components:

- Study A: Season Extension;
- Study B: Additional Commodities;
- Study C: Resupply Operations;
- Study D: Grain Shipping Costs.

This Executive Summary provides a brief overview of the objective, scope, major findings and conclusions of Study B.

#### Objective

As stated in the Terms of Reference, the study objective is:

- "....to identify economically viable ways to increase the utilization of the Port of Churchill as a gateway to and from off-shore markets."

Study Scope

The scope of the study is to identify markets for commodities produced or consumed in Manitoba, Saskatchewan and Alberta which move to or from Northern or Central Europe or other areas that may be competitively served from the Port of Churchill. In addition to other potential new commodity flows that may be identified, consideration is required of the economic feasibility of:

- shipment of ores from Nanisivik through Churchill to the smelter at Flin Flon;
- refinement at Churchill of crude oil from Bent Horn and the supply from Churchill of petroleum fuels to the Eastern Arctic;
- drying at and exporting from Churchill corn produced in the northern border areas of North Dakota and Minnesota; and
- handling of inbound shipments of alumina.

In addition the study is to provide an updated inventory of existing facilities and services at the Port of Churchill, including rail support, transshipment facilities and marine support services, relevant to additional commodities. The study is to identify and assess institutional concerns which may affect movement of additional commodities to the Port and is to identify sites at or near the Port which would be appropriate for storage, handling and transshipment of the additional commodities identified in the study. New facilities of this type are to be identified if required and their capital costs estimated.

The study is to provide a comparative analysis of the relative costs of shipping the additional commodities through Churchill and through alternative routings (e.g. the Great Lakes/St. Lawrence Waterway or the

Port of Vancouver). This comparison will use similar methods and draw upon the results of the grain shipping costs developed in Study D, and the comparison will provide a basis for selecting those additional commodities for which shipment through Churchill may be economically competitive. For any such commodity, estimates will be made of the rates which would have to be charged to generate a commercial return to the operator. The study is to identify exporters and importers located in the four Western provinces of Canada which could potentially utilize facilities and will identify relevant requirements for Port services at Churchill. Attention is to be paid to any cost advantages and disadvantages or other concerns of ship owners regarding the use of Churchill, any other problems which shippers may have with using Churchill, and suggested solutions to these problems. It will assess the impact, if any, which the handling of additional commodities would have on the Port's capacity to handle grain.

For any products and markets for which Churchill is found to be a viable Port of exit or entry, the study is to outline an action plan for improving the utilization of Churchill.

Methodology

The methodology adopted was to develop an initial long list of potential commodities and then subject this list to a number of tests or successive screenings in terms of the suitability of the commodity for movement through Churchill and the relative economics of that movement compared with the export/import channel now used in each case.

The sections of this Executive Summary mirror the chapter structure of the main report.

## 2. CANDIDATE COMMODITIES FOR MOVEMENT THROUGH CHURCHILL

Potential movements to be included in the long list were identified using both of the following two criteria:

- the commodity must move to/from West Coast Mainland Ports or Thunder Bay from/to Atlantic Ports in sufficient quantities (over 25,000 tonnes annually);
- the product must move to/from the Prairie provinces from/to marine import/export by rail in sufficient quantities (over 25,000 tonnes annually).

This assumes that any export/import commodities moving from/to the Prairies in significant volumes by truck and air are unlikely to shift to movement by rail to/from Churchill.

The 25,000 tonne limit used in the above criteria represents one full ship load of movement for typical vessels using Churchill. Since not all of these movements would be attracted to Churchill, commodities with annual movements of less than 25,000 tonnes would move in at most one load or a few partial ship load quantities each year such that any investment required at the Port of Churchill to handle these relatively insignificant movements is highly unlikely to be economic compared to established movement channels.

Based on these criteria and related considerations as described in Section 2.1 of the report, the following commodities were retained in the long list, based on present movements:

Exports

- Wheat;
- Barley;
- Rapeseed;
- Fodder and Feed;
- Rye;
- Flaxseed;

Imports

- Phosphate Rock

- Sulphur;
- Coal;
- Wood Pulp;
- Potash.

Through personal and telephone contacts with relevant government agencies and private companies, and drawing on the judgment of the Study Team, an assessment was made of relevant potential commodity movements that may occur in the future. The resulting additions to the list of potential commodities are as follows:

- fertilizers and fertilizer ingredients including those that are ammonia based and urea based;
- alumina inbound and aluminum products outbound, if a proposed smelter in Manitoba is built;
- forest products;
- farm machinery and implements both inbound and outbound;
- Arctic ores;
- Arctic oil;
- North Dakota grains;
- liquor imports from Northwestern and Eastern Europe.

This list of future potential commodities was added to the early list of potential commodities based solely on current movements, to give a long list of potential commodities.

## 3. ANALYSIS OF POTENTIAL COMMODITIES

The various commodities identified as having some possibility of moving through the Port of Churchill were then examined in terms of their movement characteristics. Based on this examination, some commodities were then removed from further consideration.

The reasons for removing commodities from the list at this stage of the analysis are discussed at length in Section 3.1 of the report. They include the following:

- rail rate disadvantage owing to the distance from Churchill of the origin or destination of the commodity in Canada;
- institutional constraints;
- extreme variability of annual movements;
- seasonality considerations;
- costs of stockpiling product required by the relatively short existing Churchill shipping season;
- cost competition for Canadian export commodities from other countries;
- diseconomies of importing commodities which are already produced in Canada;
- postponement of plans for further Canadian processing/export of commodities owing to weak world markets;
- postponement of mine developments for similar reasons and diseconomies of processing certain ores in Canada; and
- lower transportation costs via other Canadian ports of entry/exit or via other modes such as rail and/or truck for serving North American origins/destinations.

The first screening process resulted in a short list of commodities as follows:

| Exports | Imports |
|---|---|
| o Sulphur; | o Phosphate Rock |
| o Coal; | |
| o Potash. | |

A comparison of the cost of moving the product through Churchill with the cost via other potential routes was then performed (described in Section 3.2) for the short list of commodities.

As shown in Exhibit 3.2 of the report, the main origins of sulphur moving through Churchill would be Ram River, Medicine Hat and Edmonton, Alberta,and the main destinations for sulphur would be eastern South America (e.g. Brazil, Argentina), Africa, Europe and the USSR. The main origin for coal moving through Churchill is Central Alberta and the main destinations would be Europe and Brazil. The main origins for potash moving through Churchill are Rocanville, Estherhazy, Saskatoon and Regina, Saskatchewan, and the main destination would be Brazil. The origin for phosphate rock imported through Churchill is Florida and the main destinations would be Redwater and Calgary, Alberta.

The three short listed export commodities and the one short listed import commodity were then subjected to substantially more detailed cost analysis, as described in section 3.2 of the report. Schedules of rail and marine rates were developed and cost comparisons were carried out for the relevant alternate routes and modes, including terminals/ transshipment costs.

Eight scenarios of individual bulk commodity movements were subjected to these detailed cost comparisons. Based on this it was found that three of the movements show some possibility of being economic compared to the current movements through Vancouver. For these individual movements, namely sulphur to Europe, sulphur to the USSR and potash to Brazil, Churchill would offer the lowest shipping cost of the three routes considered if the Churchill terminal and any additional rail associated costs are less than $5.50 per tonne for sulphur to Europe, $5.10 per tonne for sulphur to the USSR and $12.85 per tonne for potash to South America, under medium ocean freight market conditions. These three potential movements were therefore carried forward for further analysis.

For the other movements, the per tonne amounts available to cover terminal handling costs and any extra rail associated costs at Churchill are shown to be negative. These movements include sulphur to Argentina and Brazil, sulphur to Northwest Africa, coal to Europe, coal to Brazil, and phosphate rock from Florida. Shipping through Thunder Bay is more expensive than shipping through Churchill for each of the eight additional commodity movements included in this comparison. There is also no margin available for terminal costs in Thunder Bay, compared with Vancouver, except in the case of potash movements. The Thunder Bay route was therefore left out of additional comparisons.

Since phosphate rock movements from Florida could serve as a back haul to outbound potash and/or sulphur to reduce the total cost of combined movement, the phosphate rock movement was also retained for more detailed analysis. The above analysis included rates for transportation and handling only and no allowance was made for any extra costs introduced by the short season at Churchill and resulting stockpiling requirements. This was addressed in a subsequent analysis as outlined below.

Various combinations of sulphur, potash and phosphate movements through the Port of Churchill were also examined in terms of costs relative to the alternate of routing through Vancouver. The reason that joint commodity scenarios were examined is that using the Port of Churchill to handle more than one non-grain commodity movement would increase the total volume of product handled through the Port and might therefore reduce the unit terminal handling costs at the Port through economies of scale. Based on this, seven individual and combined commodity movements through the Port of Churchill were retained for more detailed analysis of terminal costs in Churchill and any additional rail costs associated with Churchill movements:

- o sulphur to Europe and USSR during the Churchill navigation season;
- o potash to South America during the Churchill navigation season;

- o potash to South America with year-round rail shipment to Churchill;
- o sulphur to Europe and USSR and potash to South America during the Churchill navigation season;
- o sulphur to Europe and USSR and potash to South America with year-round rail shipment of potash to Churchill;
- o sulphur to Europe and USSR, potash to South America with phosphate rock back hauled from Florida, moved only during the Churchill navigation season;
- o sulphur to Europe and USSR, potash to South America with phosphate rock back hauled from Florida and year-round rail shipment of potash and phosphate rock to/from Churchill.

## 4. PORT OF CHURCHILL TERMINAL FACILITIES AND COSTS

Chapter 4 of the report describes the existing facilities for commodity handling at the Port of Churchill and assesses improvements required to enable the Port to handle additional bulk commodities and the terminal charges which would be required to provide a commercial return on such facilities.

Eight basic material handling schemes for the inbound and outbound non-grain commodities retained for this analysis were investigated to obtain:

- o an assessment of throughput capacity achievable;
- o order of magnitude capital and operating costs;
- o identification of limitations and restrictions as well as relative advantages and disadvantages.

Detailed descriptions of the schemes, including sketch plans and summaries of related costs, operating features and limitations, are presented in Appendix E of the report.

In the investigation of material handling requirements, the range of possible volumes of inbound and outbound bulk commodities was from 72,500 tonnes to 1.4 million tonnes, based on the analyses of Chapter 3 as outlined above. As shown in Exhibit 4.2 of the report (reproduced following), the average total costs per tonne for handling the candidate inbound or outbound commodities range from $7.05 (for the movement of 800,000 tonnes of outbound sulphur and potash and inbound phosphate rock) to $39.08 (for the movement of 72,500 tonnes of outbound potash). As would be expected, rates are substantially lower for higher throughputs.

## 5. OVERALL COST COMPARISON FOR POTENTIAL BULK COMMODITY MOVEMENTS THROUGH THE PORT OF CHURCHILL

Chapter 5 of the report presents comparisons of the total costs to shippers of moving each of the seven combinations of bulk commodities listed at the end of Section 3 above through the Port of Churchill versus through Vancouver. These final comparisons take into account the potential terminal charges at Churchill estimated in Chapter 4, as well as additional costs associated with the requirement to upgrade the Churchill rail line to accommodate conventional hopper and open gondola cars. The latter analysis compares the costs of using articulated hopper cars on the Churchill rail line versus refurbishing the rail line to use conventional hopper cars, drawing upon the more detailed analysis carried out in Study D. The results of these analyses show that, based upon information now available, refurbishment of the Churchill line would be more economical than using articulated hopper cars for additional commodities when more than 350,000 tonnes of all commodities (including grain) are moved over the line each year. A similar analysis of the trade-off between refurbishment of the line and purchase of specialized cars reported on Study D resulted in a higher estimate of the volume of grain required to make refurbishment of the line preferable, because of the potential use of the Churchill articulated hopper cars on load restricted branch lines during the remainder of the year.

# exhibit 4.2B

TERMINAL CHARGES FOR JOINT BULK COMMODITY MOVEMENTS THROUGH CHURCHILL

| COMMODITY SCHEME | OUTPUT (TONNES) | | | CAPITAL COSTS ($) | | | | | | OPERATING COSTS ($) | TOTAL ANNUAL COSTS ($) | TOTAL COST/ TONNE ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | THROUGHPUT INBOUND | THROUGHPUT OUTBOUND | TOTAL THROUGHPUT | WHARF | LOADING FACILITIES | TRACK | STORAGE BUILDINGS/ FACILITIES | TOTAL | ANNUAL CAPITAL | | | |
| 1. Sulphur to Europe and U.S.S.R. | | 210,000 | 210,000 | | 1,200,000 | 2,350,000 | 400,000 | 3,950,000 | 483,170 | 1,820,500 | 2,303,670 | 10.97 |
| 2. Potash to South America with Year-Round Rail Shipment to Churchill | | 290,000 | 290,000 | | 14,800,000 | 2,800,000 | 5,000,000 | 22,600,000 | 2,955,680 | 194,900 | 3,150,580 | 10.86 |
| 2b Potash to South America | | 72,500 | 72,500 | | 14,800,000 | 2,800,000 | 3,500,000 | 21,100,000 | 2,783,000 | 50,000 | 2,833,000 | 39.08 |
| 3a Sulphur to Europe and U.S.S.R. and Potash to South America | | 210,000 (sulphur)<br>72,500 (potash)<br>282,500 | 282,500 | | 14,800,000 | 2,800,000 | 5,500,000 | 23,100,000 | 3,013,180 | 190,000 | 3,203,180 | 11.34 |
| 3b Sulphur to Europe and U.S.S.R. and Potash to South America with Year-Round rail shipment of Potash to Churchill | | 210,000 (sulphur)<br>290,000 (potash)<br>500,000 | 500,000 | | 14,800,000 | 2,800,000 | 7,000,000 | 24,600,000 | 3,185,680 | 337,000 | 3,522,680 | 7.05 |
| 6a Sulphur to Europe and U.S.S.R., Potash to South America with Phosphate Rock Backhaul from Florida | 75,000 | 210,000 (sulphur)<br>72,500 (potash)<br>282,500 | 357,500 | | 15,200,000 | 2,800,000 | 5,900,000 | 23,900,000 | 3,114,800 | 850,000 | 3,964,800 | 11.09 |
| 6b Sulphur to Europe and U.S.S.R., Potash to South America with Phosphate Rock Backhaul from Florida and Year-Round rail shipment of Potash and Phosphate Rock to/from Churchill | 300,000 | 210,000 (sulphur)<br>290,000 (potash)<br>500,000 | 800,000 | | 26,800,000 | 2,800,000 | 10,000,000 | 39,600,000 | 5,199,880 | 437,000 | 5,636,800 | 7.05 |

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As noted in Study D, comparisons between these rail car/rail line refurbishment options must be considered preliminary at this time until the more detailed cost information and testing results are available from a current study being carried out by CN under the Canada-Manitoba Subsidiary Agreement on Churchill. While the articulated hopper cars appear to be more viable for grain movement based on the preliminary information, the results noted here for additional commodities suggest that, if the economic comparisons are quite close, it might be preferable to select the option of refurbishing the rail line, since this would more effectively keep the option open of moving additional commodities through Churchill in future years.

Exhibit 5.3 in the report (following) presents the overall comparison of the cost to shippers of moving each of the various combinations of potash, sulphur and phosphate rock identified in Section 3 above as potential movements to/from Churchill relative to the costs of moving them through Vancouver, including terminal costs at Churchill and costs for refurbishing the Churchill line to accommodate conventional hopper cars. The results show that none of the commodity schemes considered could be handled through Churchill on an economic basis at present. This is true under all scenarios for ocean freight rates. The commodity scheme with the smallest potential loss is the movement of sulphur to Europe and the USSR and potash to Brazil with a full year's shipment of potash, estimated to be between $1.48 per tonne and $3.55 per tonne more expensive than handling these movements through Vancouver. The most uneconomic movement considered, shipping 72,500 tonnes per year of potash to Brazil, would result in a greater expenditure of about $30 per tonne relative to movement via Vancouver. For most of the other schemes considered, movement through Churchill would be in the order of $5 to $12 per tonne more expensive than movement through Vancouver.

It should be pointed out that, while these costs include (for those options requiring the movement of year round shipment volumes through the Port of Churchill) the increased interest cost of carrying

inventory because of the relatively short Churchill shipping season, they do not include any costs for the physical storage of these increased inventories. The potential impacts of a longer Churchill season (e.g. 17 weeks rather than 12 weeks) on the inventory carrying costs were investigated. The potential reduction in interest costs on additional inventory with the longer Churchill season, on a per tonne basis, was found to be less than the cost disadvantage via Churchill in all cases. Therefore, a longer season would not result in overcoming the estimated cost disadvantages of Churchill for any of the schemes.

## 6. CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

Essentially the conclusions of this study are negative in that no commodity was found to be more economic as a movement through the Port of Churchill than through existing export or import channels (Vancouver in most cases) when all costs were taken into account, including:

- expected railway rates for the movement of bulk commodities;
- railway car ownership costs;
- additional Churchill railway line costs needed to upgrade the line to accept conventional rail cars;
- actual terminal charges at Vancouver and estimated terminal charges at Churchill;
- ocean freight rates.

Of all the potential movements through Churchill, the one that comes closest to being economic is a combination of the movement of sulphur from Alberta to Europe and to the USSR during the Churchill navigation season, with potash moving from Saskatchewan to Brazil in year-round quantities by stockpiling either at the mine or at Churchill.

It should be noted, however, that in this comparison, although the interest charges of carrying year round inventory for the potash have been included in the comparison, the actual physical storage costs have not.

If the investment for refurbishment of the Churchill line to accept standard railway hopper cars is excluded from the equation, then in two of the three freight rate scenarios the Churchill route would appear to be marginally economic for this movement. This is a very tenuous conclusion, however, based as it is on a number of assumptions favourable to Churchill including:

- this movement would not be charged any of the cost of upgrading the line;
- railway bulk freight rates on the Churchill route can be lowered to a level similar to those on other, main line routes to Vancouver;
- no additional physical storage costs need to be included for the storage of potash beyond those required for the transfer between rail and vessel;
- a rate of return of 11% would be sufficient for the terminal facilities. This before tax rate of return is comparable to those required for public investments but is probably insufficient for private investment in facilities.

All in all, therefore, specific steps for new investment in Churchill are not justified at this time. Such investment could, of course, become justified at some point in the future due to new technology, the development of new commodity movements to/from points located relatively near Churchill and/or major changes in the volumes and origin/destination patterns of existing bulk commodity movements.

Recommendations of the Study Team

Based upon these findings, the study team makes the following recommendations:

1. The various shippers of bulk materials in Western Canada, particularly those of sulphur and potash, should be kept informed of the potential of the Port of Churchill for their use. They should be encouraged to investigate alternative schemes for handling bulk materials through this Port in the light of changing circumstances.

2. New developments in commodity movements should be monitored in order to determine if there are major changes in the volume or origin/destination patterns of commodity movements (such as increased sulphur volumes to Europe) that might improve the competitiveness of Churchill or if there are new commodity movements which might be developing which potentially could move through the Port of Churchill. Examples of the latter are the development of the forest industry in Northern Manitoba and the construction of an aluminum smelter in Manitoba, particularly if it is located in Northern Manitoba. With regard to the proposed aluminum smelter, it should be noted that the Federal and Manitoba Governments have recently initiated a study of the transportation requirements of such a development.

3. Results of this study should be circulated to the various industries and their comments solicited.

4. The review of the changes in the environment that might lead to a more fruitful use of Churchill should be made at least once every three years. It would be desirable that these reviews be conducted jointly by the Province of Manitoba and the Government of Canada. This review would, of course, take into account any changes in government policy and funding regarding Churchill and its rail line, as discussed more fully in the Study D report.

5. As noted earlier, if results of a parallel project under the Canada-Manitoba Subsidiary Agreement on Churchill indicate that the economics of using articulated hopper cars on the Churchill line versus refurbishing the line to take conventional hopper cars are about equal, consideration should be given to the line refurbishment option since this would better leave open the option of future movement of additional commodities through the Port of Churchill.

The Province of Manitoba may wish to consider setting up a special group, either on its own or in cooperation with the Government of

# exhibit 5.3B

FINAL COST EVALUATION OF POTENTIAL JOINT BULK COMMODITY MOVEMENTS THROUGH CHURCHILL

| COMMODITY SCHEME | VOLUME (TONNES PER YEAR) | | MAXIMUM CHURCHILL TERMINAL AND EXTRA RAIL-ASSOCIATED COSTS TO BREAK EVEN WITH VANCOUVER ROUTE ($/tonne) | | | TERMINAL COSTS AT CHURCHILL ($/tonne) | CHURCHILL LINE REFURBISHMENT COST** ($/tonne) | TOTAL SAVINGS AVAILABLE BY USING CHURCHILL ROUTE INSTEAD OF VANCOUVER ROUTE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | THROUGHPUT INBOUND | THROUGHPUT OUTBOUND | LOW FREIGHT RATES | MEDIUM FREIGHT RATES | HIGH FREIGHT RATES | | | LOW FREIGHT RATES | MEDIUM FREIGHT RATES | HIGH FREIGHT RATES |
| 1. Sulphur to Europe and USSR | | 210,000 | 1.11 | 5.43 | 8.26 | 10.97 | 3.10 | -12.96 | -8.64 | -5.81 |
| 2A. Potash to South America with year-round rail shipment to Churchill | | 290,000 | 9.38 | 8.40 | 7.77 | 10.86 | 2.90 | -4.38 | -5.36 | -5.99 |
| 2B. Potash to South America | | 72,500 | 13.48 | 12.85 | 12.44 | 39.08 | 3.60 | -29.20 | -29.83 | -30.24 |
| 3A. Sulphur to Europe and USSR and Potash to South America | | 210,000 (sulphur) 72,500 (potash) 282,500 | 4.27 | 7.32 | 9.33 | 11.36 | 2.90 | -9.97 | -6.92 | -4.91 |
| 3B. Sulphur to Europe and USSR and Potash to South America with year-round rail shipment of Potash to Churchill | | 210,000 (sulphur) 290,000 (potash) 500,000 | 5.90 | 7.15 | 7.97 | 7.05 | 2.40 | -3.55 | -2.30 | -1.48 |
| 4A. Sulphur to Europe and USSR, Potash to South America with Phosphate Rock backhaul from Florida | 75,000 | 210,000 (sulphur) 72,500 (potash) 282,500 | 1.32 to 1.75* | 3.59 to 4.02* | 5.07 to 5.51* | 11.09 | 2.70 | -12.47 to -12.04* | -10.20 to -9.77* | -8.72 to -8.28* |
| 4B. Sulphur to Europe and USSR, Potash to South America with Phosphate Rock backhaul from Florida and year-round rail shipment of Potash and Phosphate Rock to/from Churchill | 300,000 | 210,000 (sulphur) 290,000 (potash) 500,000 | -1.21 to -.03* | -0.43 to 0.35* | .03 to .81* | 7.05 | 1.90 | -10.16 to -8.98* | -9.38 to -8.60* | -8.92 to -8.14* |

* Range of values, actual value depending upon the total railway charge for the part of the rail movement having a backhaul. The left-hand value in the range assumes that the railway charges 1.8 times the normal one-way loaded rate for the two-way journey with backhaul, while the right-hand value assumes that the railway charges 1.2 times the normal one-way loaded rate for the two-way journey with backhaul.

** Estimated annual capital cost for Churchill line upgrading to accommodate conventional hopper and gondola cars, based on an assumed volume of 750,000 tonnes per year of grain movement in addition to the other bulk commodity movements, and using an average value of the low and high capital costs ($17,500,000 and $35,000,000) estimated for refurbishing the line.

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the Northwest Territories, to facilitate and encourage Arctic resupply activities through the Port of Churchill, as discussed more fully in the Study C report. If this course of action is followed, the above monitoring and "marketing" activities regarding future use of the Port for additional commodities could also be taken on by the same group or corporation.

# PORT OF CHURCHILL SEASON EXTENSION

## STUDY A

## EXECUTIVE SUMMARY

### 1. STUDY OBJECTIVES AND SCOPE

This study was conducted on behalf of the Government of Canada, Transport Canada, and the Government of Manitoba, Department of Highways and Transportation, under the Canada-Manitoba Subsidiary Agreement on Churchill. It is part of an overall study of the Port of Churchill conducted on an integrated basis by IBI Group and its associated consultants, with the following components:

- Study A: Season Extension;
- Study B: Additional Commodities;
- Study C: Resupply Operations;
- Study D: Grain Shipping Costs.

This Executive Summary provides a brief overview of the objective, scope, major findings and conclusions of Study A.

#### Objective

As stated in the Terms of Reference, the study objective is as follows:

> to "evaluate the support requirements, the technical feasibility, the costs and the benefits of implementing an extension to the normal shipping season at the Port of Churchill."

## Study Scope

The study is to assess the support requirement, technical feasibility and costs of providing marine services both en route and within the Port, including Port facilities as well as services. It is to identify the supply of vessels capable of operating during a season extension, assess the risks to vessels and the associated costs and estimate the freight rates that would apply. It is also to assess the incremental risk to the environment and any associated costs from season extension, and any technical problems and the associated costs of providing rail service to Churchill in an extended season.

The study is also to identify and evaluate the economic costs and benefits associated with season extension, in the context of estimated future traffic that would utilize the extended season, and to estimate the net benefits of season extension under various levels of future traffic. The sensitivity of net benefit estimates to variations in season extension length (both in the spring and the fall) is also to be assessed. Conclusions are to be drawn from the analysis and, if applicable, an action plan recommended proposing a sequence of necessary events and investments that would be required to achieve a feasible season extension.

The following sections of this Executive Summary mirror the structure of the report.

## Major Issues

There are a number of major issues addressed in Chapter 1 of the report which provide a context for the remainder of the study, including insurance and regulatory constraints on season extension, and grain forecasts and availability. These are highlighted briefly in the following paragraphs.

## Insurance and Regulatory Constraints

As noted in sub-section 1.3.1 of the report, insurance requirements of the London underwriters have, until late 1985, effectively limited the Churchill shipping season to about 12 weeks (July 26 through to October 18) or (with a surcharge on premiums of 25%) to October 25. Discussions between the Government of Manitoba, the Government of Canada and the insurance industry, held during the fall of 1985, resulted in an agreement by the London underwriters to review the insuring conditions for vessels trading into Churchill and, as an interim measure, to provide insurance and assess premiums on a case-by-case basis taking into account factors such as the time of season, type of vessel, captain's experience in ice navigation, and other relevant factors. A more comprehensive insurance agreement will be developed during 1986 under which the insurance season will fall within the regulations set by Canada's Arctic Waters Pollution Prevention Act (AWPPA), as is already the case for Canadian insurers. The new arrangements are expected to remove insurance availability and cost as a major impediment to use of the Port of Churchill for vessels operating within AWPPA regulations.

The AWPPA regulations divide the Canadian Arctic into control zones for navigation control and pollution control purposes. The earliest permissible arrival dates and latest departure dates for each zone are specified for each vessel classification, ranging from the highest class of ice strengthened vessel relevant to this study (Class A) to the lowest (Class D) and non-ice strengthened (Class E). The regulations are such that the approximate maximum allowable season at Churchill for type E vessels is about 100 days, for type D vessels about 118 days, for type C vessels about 140 days, for type B vessels about 145 days, and for type A vessels about 155 days. Under these regulations, a Class E vessel could enter Churchill on about July 24 at the earliest and would have to leave it by about October 29 at the latest. The relevant dates for a type D vessel are July 12 and November 6, while those for a type C vessel are

July 5 and November 21. To put this in context, of the 115 vessels which used the Port of Churchill during the years 1977-1984 inclusive for which classification data is available (there were 163 vessels in total of which 48 were not classified) 41 vessels or 36% were not ice strengthened and 74 vessels or 64% were ice strengthened Type D or better). This suggests that, operating within AWPPA limits, over one third of the types of vessels historically using the Port could operate within a 100 day season and the remainder of almost two thirds could operate in an extended season of 118 days or more, depending on their degree of ice strengthening.

Grain Forecasts and Availability

A number of forecasts of Canadian grain production and export levels were reviewed in the context of recent trends and it was concluded that the projections to the year 1990 prepared in 1984 by the Canada Grains Council are still valid; these were therefore adopted as the base case projection for the study. This projection shows total grain exports through Churchill in 1990 of 888,000 tonnes, which is rounded to 900,000 tonnes or 75,000 tonnes per week over the normal 12 week season between July 26 and October 18. The base case economic evaluation of season extension (outlined below in Section 7 and in more detail in Chapter 7 of the report) is therefore based on a throughput of 75,000 tonnes per week; to test the sensitivity of season extension to higher or lower levels of Port usage, throughput levels of 65,000 tonnes per week and 85,000 tonnes per week are also analyzed.

Drawing upon the findings of Study D regarding the areas in Northern Saskatchewan and Manitoba for which the rail rate to Churchill is lower than that to any other grain port (the Churchill rail rate advantage area) an analysis is made of the availability of grain in that area in relation to potential Churchill throughput levels for an extended season.

To illustrate this, a hypothetical extended season of 20 weeks, at a Churchill throughput rate of 85,000 tonnes per week, giving a hypothetical seasonal throughput of 1,700,000 tonnes, was examined. As shown more fully in sub-section 1.3.2, even under this maximum throughput scenario, the Port of Churchill would be handling only 9.3% of the total Canadian export grain moving through Atlantic seaboard ports and Churchill's share of the projected increase in wheat and barley production in the Churchill rail rate advantage area (over the 1976-81 base period of the Canadian Grains Council study) would be about 33%, leaving about two thirds of the increased production to move through Thunder Bay. These estimates are for 1990, based on the Canada Grains Council projection referred to earlier.

## 2. RAIL LINE AND ELEVATOR/PORT THROUGHPUT CAPABILITY

Chapter 2 provides an assessment of the throughput capability of the Churchill delivery system, including the rail line, rail/elevator interface, elevator, and elevator/vessel interface. This is based on current rated capacities of the various system components as discussed with operating staff of the railway, elevator and Port and, equally important, on demonstrated throughput during the year 1976 (when 719,100 tonnes were exported) and 1977 (when 755,200 tonnes were exported). These data show that the Churchill system is routinely capable of handling 70-75,000 tonnes per week and has demonstrated an ability to deliver higher volumes (80-85,000 tonnes per week) over two to three week periods. This analysis provides the basis for the higher throughput level (85,000 tonnes per week) selected for analysis in the economic evaluation of season extension.

The capability of the rail line and Port to deliver grain was then examined for a period of potential extension in the fall (from October 18 to as late as December 6) and in the spring, from July 26 to as

early as July 6). As pointed out in Section 2.4 of the report, it was concluded that the rail and elevator/Port capacity data which apply to operations in the normal 12 week season are also applicable for potential extensions of up to 7 weeks in the fall and up to 3 weeks in the spring. This assessment applies both to the existing system (using boxcars) and for the future system (for the period from the late 1980's onward) which could use rehabilitated boxcars, the new articulated hopper car which is being developed and tested currently on the Churchill line, or conventional hopper cars on a refurbished Churchill line. For purposes of the season extension economic evaluation, the articulated hopper car was used as the basis for analysis (drawing on the findings of Study D in this regard) but it is recognized that more data on the costs/capability of the articulated hopper car and on the costs/effectiveness of refurbishing the rail line will be required (from parallel studies which are to report during 1986 and 1987) before more definitive findings can be developed in this area. Regardless of which of the three options is selected for the future, it is concluded that the capability of the rail and elevator/Port delivery system for grain export movements will be as good during the extended season as during the normal season.

## 3. SEASON EXTENSION IN PORT

Chapter 3 of the study presents a description of Port facilities and operations, ice conditions in the Port, historical variations in weather and ice conditions, a week-by-week description of ice formation in the Port during the fall season based on experience over the past 20 years, and an assessment of possible ice management techniques to maintain late season operations in the harbour.

It is pointed out that the harbour is generally clear of ice about a month before the normal season opening at the end of July, such that the constraint on extending the season in the spring is en route ice conditions rather than conditions in the harbour.

The recent decision to construct a new tug for the harbour will remove an existing constraint at the end of the season, since the lesser draft of the new tug will allow it to enter the winter berth later than has been possible for the existing tug "Twolan". In order to achieve this, a building would have to be constructed to prevent moisture accumulation in the aggregate material used to seal off the winter berth from tidal action.

In terms of harbour ice conditions in the fall, a significant improvement has resulted from diversion of the Churchill River by Manitoba Hydro in 1980 for electrical power generation on the Nelson River. Prior to this diversion, which reduced typical October flow rates in the lower part of the river from about 820 cubic metres per second to about 130 cubic metres per second, the river used to dump significant concentrations of ice cakes and slush into the harbour which caused great difficulty to late season shipping. Since the diversion, with the reduced flow, most ice which forms from upstream snow storms becomes trapped at the rapids just south of the harbour and there is less formation of ice particles at the rapids, such that harbour ice problems have been substantially reduced.

Assessment of alternative ice management techniques led to the conclusion that ice suppression techniques (e.g. thermal discharge, bubblers) would be of minimal use because of the river current and tidal action, ice removal techniques would be very expensive, ice diversion (e.g. with a boom or barrage upstream of the wharf) is probably not warranted since the river diversion, and the most appropriate technique is ice breaking using the new harbour tug for ice thicknesses of up to 30 cm of slush ice and Canadian Coast Guard icebreakers, if necessary, for greater thicknesses. This would allow operation of the harbour to

November 15 in most years, with the need for conventional icebreaker support only on a restricted and occasional basis in years of heavier ice (estimated at about one year in seven). For such restricted harbour icebreaker operations by the Coast Guard vessels it would not be necessary to dredge the turning basin in the harbour; for season expansion beyond November 15, however, such dredging would be required to allow more extensive icebreaker operations in the harbour under heavier ice conditions, and these costs were included in the economic evaluation.

In summary, physical constraints on fall season extension in the harbour can be removed with relatively minor investments for the period to mid-November and, with an additional investment of about $3.1 million for harbour dredging, for the period until December 6. While the AWPPA regulations require non-ice strengthened vessels to leave Churchill by about October 29 and Type D vessels to leave by about November 6, these constraints could possibly be relieved with icebreaker escort and a change of the regulations,or the AWPPA regulations could be observed, allowing only the appropriately ice-strengthened vessels to use the Port up to the final closing date. These factors, and the costs of relieving the constraints and allowing Port operations into successively later weeks during the fall, are taken into account in the economic evaluation of season extension.

## 4. SEASON EXTENSION EN ROUTE

Chapter 4 of the report provides a quantitative assessment of ice conditions affecting marine navigation between the Port of Churchill and Cape Chidley at the eastern end of Hudson Strait. Based on ice data for the past 25 years, tabulations are provided (in greater detail in Appendix A) showing the number of nautical miles along the route for which various types of ice conditions are likely to be experienced in each specific week of an extended season, for years of good ice conditions, moderate (average) ice conditions and heavy ice conditions, respectively.

The estimated vessel delays for a season extension at the beginning of the normal shipping season are summarized in Exhibit 4.4 of the report. It shows that there are no extreme delays likely to be experienced in the week July 20-26, with most values being six hours or less. During the week of July 13-19 delays of less than 1-1/2 days are likely except for about one year in 12. For the week of July 6-12 the exhibit shows that, even with icebreaker escort over sections with significant ice coverage, minimum delays of 1 to 5 days would be likely (added to a base sailing time of 3.7 days) and additional delays of 1 to 3 days may be caused if ice pressure conditions develop.

Estimated en route vessel delays due to ice conditions during an extended fall season are presented in Exhibit 4.6 of the report (reproduced following). It shows that delays do not become noticeable until the week of November 16-22, in which delays are likely to be greater than 1 day long in slightly more than 1 out of every 4 years and up to 3 days long in 1 out of 11 years. The ice conditions during the week of November 23-29 lead to an expected delay of up to 5 days in 1 out of 10 years and a delay of over 1 day in 1 out of 2 years. For the first week in December expected delays would be in excess of 3 days about every second year and in excess of 5 days about 1 year in 6. These estimates include icebreaker support as appropriate; a delay of 5 days represents an increase of about 20% in the total voyage time (including 5 days in Port), increasing it from about 27 to about 32 days. Other climatic conditions affecting marine navigation to Churchill are also discussed in Chapter 4, including temperatures, wind directions and velocities and daylight hours.

The availability of ice strengthened vessels is also assessed (Section 4.4), and it is noted that the USSR has approximately 1,000 such vessels, with an additional 50-90 owned by other Eastern European countries. There are approximately 45 ice strengthened vessels suitable for the grain trade registered in Scandanavian countries. Fednav is the only Canadian shipping company that owns and operates ice strengthened vessels under Canadian registry. This company has 10 vessels which fall into the AWPPA type B category. These have dead weight tonnages (DWT) of

exhibit 4.6A

## EXPECTED DELAY DUE TO ICE
## END OF SEASON

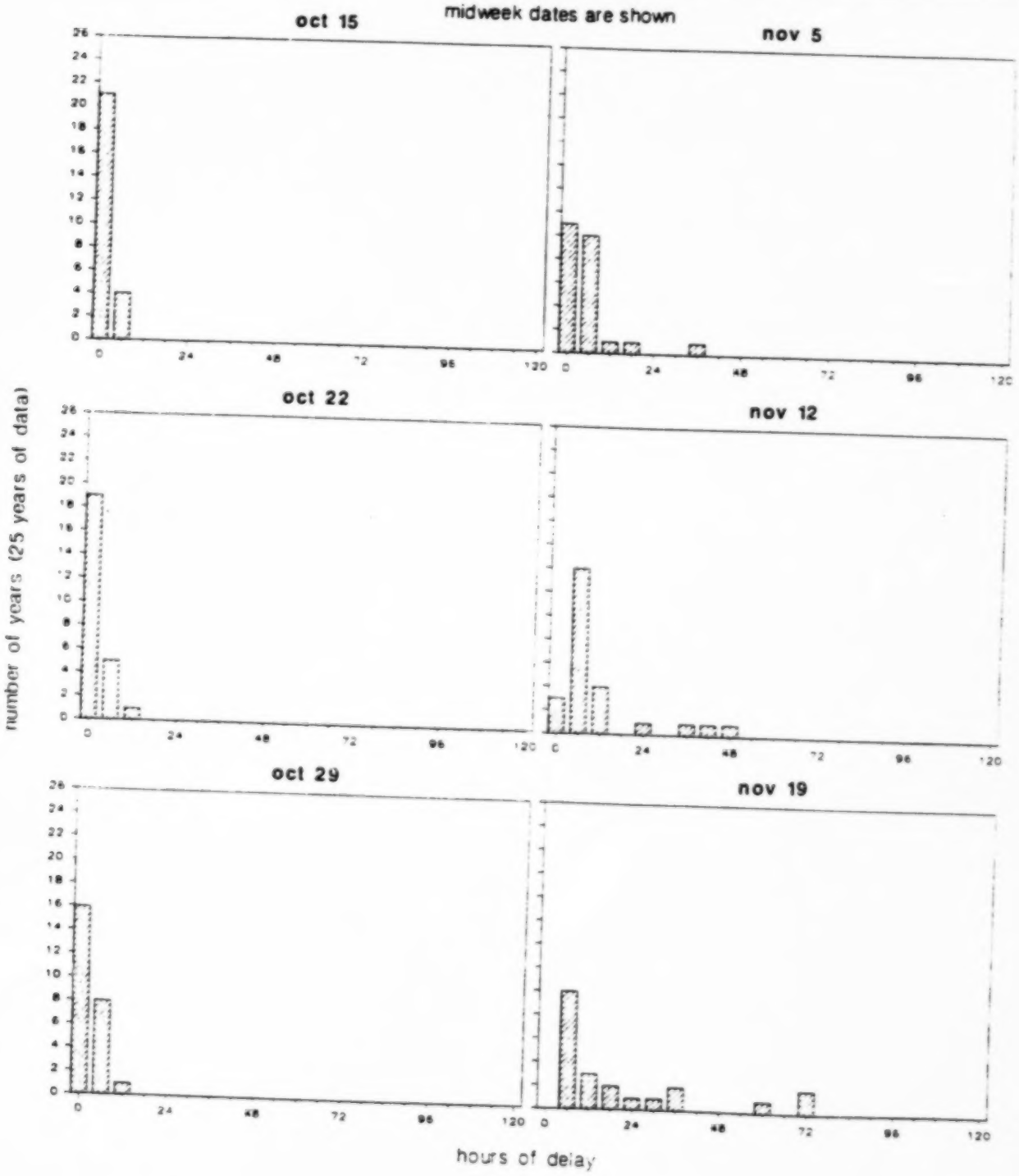
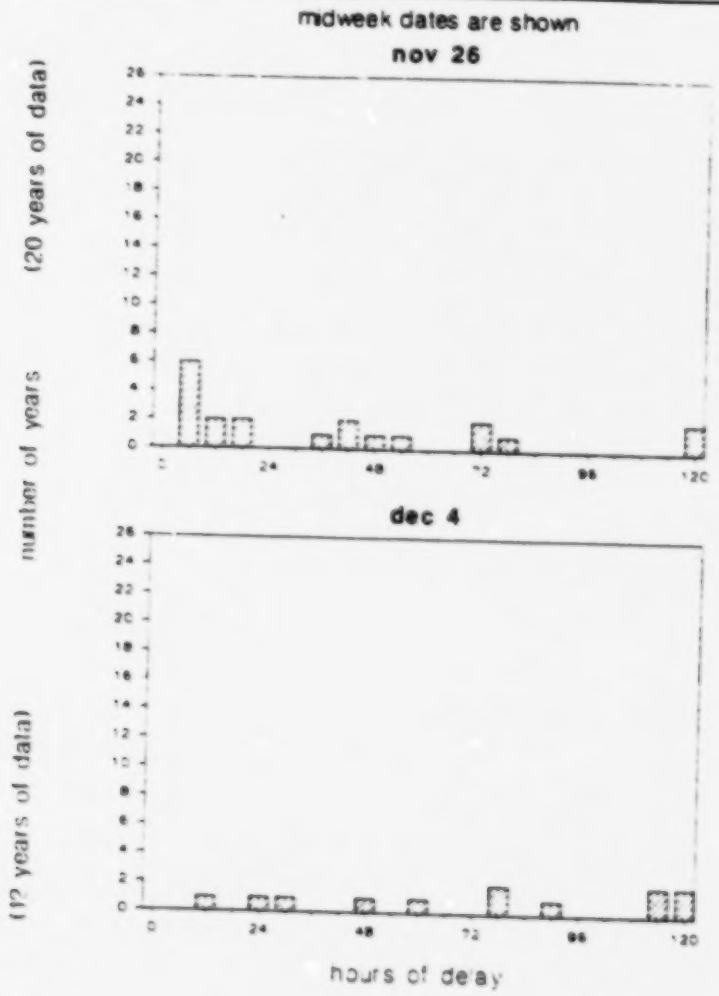


exhibit 4.6A cont'd

## EXPECTED DELAY DUE TO ICE
## END OF SEASON



28,000 to 30,000. As pointed out above in Section 1, about two thirds of the vessels using the Port of Churchill during the years 1977-1984, for which registry information is available, were ice strengthened Type D or better.

Icebreaker escort requirements under various ice conditions for each of the season extension weeks studied were estimated and are summarized in Exhibit 4.11 of the report (following). It shows that in years of moderate (average) ice conditions during the week July 20-26 a Type E vessel would likely require up to about 100 nautical miles of icebreaker escort, while Type D and Type C vessels would likely require up to about 50 nautical miles of icebreaker escort. No escort is required in average ice years for any of the three vessel types up to November 8, although a Type E vessel would probably require 100-300 miles of escort during the week ending on that date in a year of heavy ice and Type D and C vessels would require 50-100 nautical miles of escort under those conditions. During the week November 9-15 a Type E vessel would require up to 100 nautical miles of escort in an average ice year while no escort would be required under those conditions for Type D or Type C vessels. Under heavy ice conditions in the week of November 9-15 use of a Type E vessel would be not advisable and icebreaker escort of about 100-250 nautical miles would likely be required for Type D and Type C vessels. Incremental costs of the required icebreaker escort are derived from these estimates and used in the economic evaluation presented in Chapter 7 of the report. This approach acknowledges that Canadian Coast Guard icebreakers are available in the area, in support of broader national and economic objectives; the approach allocates part of their operating cost during an extended season to the Churchill grain movement, based on the probability of this being required to assist grain vessels under various conditions and the likely miles of escort required.

Other support services required for season extension are discussed in section 4.6, including ice and weather advisory services, navigational aids, search and rescue, and insurance. There are improvements which can be made in the former three categories, relative to

# ICE BREAKER REQUIREMENTS (MILES OF ESCORT)

exhibit 4.11A

| VESSEL TYPE (AWPPA CLASS) | ICE CONDITIONS | WEEK | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | JULY 6-12 | JULY 13-19 | JULY 20-26 | JULY 27-AUG 2 | AUG 3 - AUG 9 | MID AUGUST TO MID OCTOBER | OCT 11-18 |
| E | o Good | Outside AWPPA | Outside AWPPA | | | | | |
| | o Moderate | o Not Advisable | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort |
| | o Heavy Ice | o Not Advisable | o 100-200 | o Up to 100 | o No Escort | o No Escort | o No Escort | o No Escort |
| | | o Not Advisable | o Not Advisable | o 100-250 | o Up to 100 | o 100 in worst year | o No Escort | o No Escort |
| D | o Good | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort |
| | o Moderate | o 150-300 | o 50-150 | o up to 50 | o No Escort | o No Escort | o No Escort | o No Escort |
| | o Heavy Ice | o 300-700 | o 150-300 | o 50-150 | o up to 50 | o No Escort | o No Escort | o No Escort |
| C | o Good | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort |
| | o Moderate | o 150-300 | o 50-150 | o Up to 50 | o No Escort | o No Escort | o No Escort | o No Escort |
| | o Heavy Ice | 0 300-700 | o 150-300 | o 50-150 | o Up to 50 | o No Escort | o No Escort | o No Escort |

| VESSEL TYPE (AWPPA CLASS) | ICE CONDITIONS | WEEK | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | OCT 19-25 | OCT 26-NOV 1 | NOV 2-8 | NOV 9-15 | NOV 16-22 | NOV 23-29 | Nov 30 - Dec 6 |
| E | o Good | | | Outside AWPPA | Outside AWPPA | Outside AWPPA | Outside AWPPA | Outside AWPPA |
| | o Moderate | o No Escort | o No Escort | o No Escort | o No Escort | o up to 50 | Not Advisable | Not Advisable |
| | o Heavy Ice | o No Escort | o No Escort | o No Escort | o Up to 100 | o Not Advisable | Not Advisable | Not Advisable |
| | | o No Escort | o Up to 50 | o 100-300 | o Not Advisable | o Not Advisable | Not Advisable | Not Advisable |
| D | o Good | | | | Outside AWPPA | Outside AWPPA | Outside AWPPA | Outside AWPPA |
| | o Moderate | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort | Up to 50 | 100-400 |
| | o Heavy Ice | o No Escort | o No Escort | o No Escort | o No Escort | o 50-200 | 50-400 | Not Advisable |
| | | o No Escort | o No Escort | o 50-150 | 0 100-250 | o 200-800 | Not Advisable | Not Advisable |
| C | o Good | o No Escort | o No Escort | o No Escort | o No Escort | o No Escort | Outside AWPPA | Outside AWPPA |
| | o Moderate | o No Escort | o No Escort | o No Escort | o No Escort | o 50-200 | No Escort | 100-400 |
| | o Heavy Ice | o No Escort | o No Escort | o No Escort | o 100-250 | o 200-700 | 50-400 | |
| | | | | | | | 400-800 | Not Advisable |

season extension at Churchill, as suggested in that section and at the end of the report. As noted earlier, the impacts of insurance dates are in the process of being relaxed, such that the AWPPA season limits are expected to apply for insurance purposes in the future.

Environmental considerations of season extension are also discussed (section 4.7) and it is pointed out that environmental risks and associated costs which might result from season extension are expected to be negligible provided that the AWPPA season limits by vessel type, are not exceeded. While not recommended by this study, if the AWPPA limits were to be exceeded (e.g. by allowing operations outside of the limits, through a change of the legislation, under carefully specified conditions of icebreaker support, provision of information, and use of ice pilots) it would be desirable to conduct an environmental assessment before such changes were introduced in the future.

## 5. PORT SERVICES

Port services for season extension are discussed in Chapter 5, including tug assistance, ship repair, communications and pilotage/Port Warden services. The conclusions are carried forward for use in the economic evaluation of Chapter 7.

It is noted that the new tug which is to go into operation for the 1986 season will remove an earlier restriction on the shipping season in the fall (normally occurring about October 18) caused by winter berthing requirements of the existing tug "Twolan", such that the new tug should be available until at least November 15 to assist vessels entering and leaving the harbour and to provide ice breaking services within the harbour (for ice thicknesses up to about 30 cm)*. Icebreaker assistance

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* The tug is designed to operate in fast ice up to 15 cm thick. As discussed in sub-sections 3.2.7 and 3.5.2, this should be sufficient capability to keep the harbour open in most years until November 15, and occasional icebreaker support would be called on as required in years with heavy, early ice formation.

would be required for later season extensions as discussed in Chapter 4 of the report.

Ship repair services are found to be reasonably adequate for minor repairs of ice damage to vessels and it is suggested that any upgrading be left to the discretion of the local Ports Canada staff.

Season extension at Churchill will require a corresponding extension in the period of operation of the radio stations at Churchill and Frobisher Bay operated by the Canadian Coast Guard, at small incremental cost.

## 6. PORT RECONFIGURATION

An engineering and broad economic assessment was made of physical modifications that might be required in order to achieve the range of incremental season extensions under study and to assess whether the season extension objectives might be more cost-effectively achieved by relocating the Port facilities.

The main findings in terms of physical modifications are that no new facilities are required to achieve the proposed levels of season extension (one week in the spring and four weeks in the fall), on the assumption that the new tug will be able to move vessels in the harbour under ice thickness of up to 30 cm (generally to mid-November). The only physical facility identified as being required is a storage shed for holding the berm material necessary for constructing the winter berth seal at the end of the season; this would cost an estimated $30,000-$50,000. If a season extension beyond November 15 were contemplated, it would be necessary to dredge the existing turning basin to a depth of 9.2 m and to a width of 365 m (at a cost of $3.1 million) in order to allow operations by conventional icebreaker vessels within the harbour.

Two harbour relocation options were studied, both of which would aim to reduce the problems of floating ice and solid ice formation in the harbour during the fall. (As noted earlier these problems have been significantly decreased following diversion of the Churchill River by Manitoba Hydro in 1980.)

Option 1 would move the wharf and related Port facilities approximately 1 to 2 kilometres south of its present location. This would move the wharf out of the main ice flows as they currently exist, although the required dredging for the access channel might shift the main flow of the river and cause the original ice problems to recur. This option (illustrated in Exhibit 6.1 of the report) would have an estimated capital cost of about $85 million.

Option 2 would relocate the wharf and grain loading facilities outside of the rivermouth, in Hudson Bay. The proposed location would be directly east of Cape Merry, which would allow continued use of the existing grain elevator by providing a connecting conveyor. A substantial breakwater would be required, however, to provide both protection and accommodation for up to four grain vessels. Owing to the location in salt water and removed from the river currents, this option would be expected to experience a somewhat later freeze-over date on average than the existing facility. The estimated capital cost of this option would be about $78 million not including the cost of the grain conveyor.

It is concluded that neither option is economically attractive for season extension because the associated interest and annualized capital costs alone would exceed the gross operating revenues of the existing facilities at break-even throughput levels (about 700,000 tonnes per year). Since the analysis shows that, in general, en route conditions rather than harbour icing will be the constraining factor for season extension, it would be very difficult to justify Port relocation as a means to achieve season extension, particularly as long as the existing facility has adequate capacity and can remain in operation. A much greater net return would result from proceeding with season extension using the existing Port and elevator rather than building new facilities.

## 7. ECONOMIC EVALUATION OF SEASON EXTENSION

Chapter 7 presents an economic evaluation of the costs, benefits and net benefits of extending the Churchill shipping season in weekly increments, for up to three weeks at the beginning of the current season and up to seven weeks at the end of the season. For each individual week of an extended season, the costs of extending Port operations for that week are compared with the benefits associated with that week of operation. The major cost components are the marine, Port and elevator/rail costs of grain movements via Churchill during an extended season. The costs include all additional expenditures required above those which would be spent if Churchill were in use during the current season but not during the extended season (e.g. the marginal costs of season extension). The benefits are also those relative to no grain shipments during an extended season; these marginal benefits include benefits relating directly to maintaining or increasing grain shipments via the Port of Churchill and benefits (or disbenefits) relating directly to the reduction in grain shipments via Thunder Bay. It is assumed for this evaluation that any increase in grain shipments via Churchill would result in a corresponding decrease in grain shipments via Thunder Bay, reflecting the historic trade-offs of flows through the two ports, as discussed more fully in Study D.

The net benefits of season extension in one week increments (e.g. benefits minus costs) are examined in an aggregate fashion from the following five perspectives:

- Canadian economy;
- Western Canadian grain producers;
- Churchill region;
- Community of Churchill;
- Port of Churchill.

The sensitivity of estimated net benefits of season extension, particularly with regard to the Canadian economy, is assessed with respect to changes in major assumptions underlying the assessment, in particular regarding Churchill grain throughput levels, marine freight rate levels (low, medium, high) and en route ice conditions between Churchill and Cape Chidley (good, moderate, heavy). Other assumptions regarding the origins and destinations of grain which moves through Churchill and regarding the selling price of grain FOB Churchill (and the extent to which this price captures the marine freight rate advantage of the Churchill route) are also implicit in this analysis, as discussed more fully in Study D (in the Executive Summary, Chapter 4 and Chapter 7) and on the following two pages (regarding the Churchill selling price).

The base case evaluation is for a grain throughput of 75,000 tonnes per week (corresponding to the projected 1990 grain export level through Churchill of about 888,000 tonnes in a 12 week season as estimated by the Canada Grains Council in 1982. A lower throughput of 65,000 tonnes per week and a higher throughput of 85,000 tonnes per week were also assessed and, subsequently a substantially lower throughput of 40,000 tonnes per week was also evaluated. This corresponds to about 500,000 tonnes throughput during the existing 12 week season and almost 700,000 tonnes during a 17 week season. It should be noted that the economics of grain shipment at various levels through Churchill during the normal 12 week season are not treated in this evaluation; this is the subject of an extensive analysis presented in Study D.

The overall results of the economic evaluation for the base case of 75,000 tonnes per week throughput are presented in Exhibit 7.12 of the report (following). These estimates show that it is economically beneficial from the perspective of the Canadian economy to extend the shipping season at the Port of Churchill to the period from July 20 through November 15, an extension of one week at the beginning of the season and four weeks at the end of the season, to a total of 17 weeks as compared to the existing 12 week season.

exhibit 7.12A

# NET BENEFITS OF SEASON EXTENSION WITH RESPECT TO THE CANADIAN ECONOMY AT A THROUGHPUT OF 75,000 TONNES/WEEK

| WEEK ENDING | 12-Jul | 19-Jul | 26-Jul | 25-Oct | 01-Nov | 08-Nov | 15-Nov | 22-Nov | 29-Nov | 06-Dec |
|---|---|---|---|---|---|---|---|---|---|---|
| MARINE(LOW - DIRECT) | 75,000 TONNES PER WEEK | | | | | | | | | |
| GOOD YEARS | $4.84 | $5.27 | $5.32 | $6.20 | $6.20 | $5.31 | $5.35 | $0.26 | $2.24 | $2.09 |
| MODERATE | 1.45 | 4.14 | 5.00 | 6.20 | 6.19 | 5.30 | 5.26 | -0.20 | 0.23 | -4.78 |
| HEAVY ICE | -6.23 | 0.05 | 2.97 | 6.05 | 5.92 | 4.61 | 3.31 | -5.96 | -10.54 | -17.15 |
| MARINE(LOW - TRANS-SHIPMENT) | 75,000 TONNES PER WEEK | | | | | | | | | |
| GOOD YEARS | $15.01 | $15.44 | $15.49 | $16.37 | $16.37 | $15.48 | $15.52 | $10.43 | $12.41 | $12.26 |
| MODERATE | 11.62 | 14.31 | 15.17 | 16.37 | 16.36 | 15.47 | 15.43 | 9.97 | 10.40 | 5.39 |
| HEAVY ICE | 3.94 | 10.22 | 13.14 | 16.22 | 16.09 | 14.78 | 13.48 | 4.21 | -0.37 | -6.98 |
| MARINE(AVG. - TRANS-SHIPMENT) | 75,000 TONNES PER WEEK | | | | | | | | | |
| GOOD YEARS | $10.61 | $11.04 | $11.09 | $11.97 | $11.97 | $11.08 | $11.12 | $6.03 | $8.01 | $7.86 |
| MODERATE | 7.22 | 9.91 | 10.77 | 11.97 | 11.96 | 11.07 | 11.03 | 5.57 | 6.00 | 0.99 |
| HEAVY ICE | -0.46 | 5.82 | 8.74 | 11.82 | 11.69 | 10.38 | 9.08 | -0.19 | -4.77 | -11.38 |
| MARINE(HIGH - TRANS-SHIPMENT) | 75,000 TONNES PER WEEK | | | | | | | | | |
| GOOD YEARS | $3.81 | $4.24 | $4.29 | $5.17 | $5.17 | $4.28 | $4.32 | ($0.77) | $1.21 | $1.06 |
| MODERATE | 0.42 | 3.11 | 3.97 | 5.17 | 5.16 | 4.27 | 4.23 | -1.23 | -0.80 | -5.81 |
| HEAVY ICE | -7.26 | -0.98 | 1.94 | 5.02 | 4.89 | 3.58 | 2.28 | -6.99 | -11.57 | -18.18 |

This finding is based on the premise that the difference in grain price FOB Churchill versus the grain price FOB Thunder Bay reflects the difference in marine freight rates from each of those ports to overseas destinations (with Rotterdam used as a typical port). Unfortunately, owing to commercial confidentiality observed by the Canadian Wheat Board, it was not possible to obtain data on actual FOB grain selling prices at the two ports in order to verify this assumption. Based upon discussions during the study with grain shippers, traders and carriers, it was concluded by the study team that in years of strong grain markets (e.g. a sellers' market) this assumption will tend to be borne out by actual selling prices at the two ports while, in years of weak grain markets (a buyers' market) some grain customers taking delivery at Churchill may be able to negotiate a price lower than that reflecting the marine freight rate spread between Churchill and Thunder Bay. The customer may be motivated in this regard by preference for taking delivery at other Canadian ports and/or the expectation that, in a weak grain market the Canadian Wheat Board may be prepared to accept a slightly lower price at Churchill in order to maintain throughput levels at the Port while still retaining part of its rate advantage.

As shown in Exhibit 7.12, however, the net benefits of season extension during the proposed extension period under the base case are generally in the range of about $4.00-$16.00 per tonne in years of good or average ice conditions and in the range of about $2.00-$16.00 per tonne in years of heavy ice conditions; it seems likely, therefore, that even in years of weak grain markets (a buyers' market) a portion of the net benefit would still accrue to the Canadian economy even if the total marine freight rate spread is not completely reflected in the Churchill selling price for Canadian grain. A sensitivity assessment in Study D indicates that a discount of $2.00 per tonne (equal to about half of the ocean freight rate differential for the Churchill-Rotterdam movement versus the movement from a Lower St. Lawrence port to Rotterdam in a year of low ocean freight rates) in the selling price of grain FOB Churchill would not materially change the conclusions of that study. The net

benefits noted earlier in this paragraph and in Exhibit 7-12 show that the conclusions of Study A would also be basically unchanged if a $2.00 discount were experienced.

The sensitivity test at a Churchill throughput of 40,000 tonnes per week indicates that the economic findings outlined above would still apply at this lower level of grain exports through Churchill.

## 8. CONCLUSIONS AND RECOMMENDATIONS

Based on the study findings as outlined above and reported more fully in the first seven chapters of the report, Chapter 8 summarizes the overall conclusions of the study and presents a recommended action plan to achieve the level of season extension found to be economically viable.

### Conclusions

The conclusions of the study, which draw also on the grain shipping cost analyses during the normal season of Study D, may be summarized as follows:

1. In terms of grain exports, as concluded in Study D, the Port will be economically viable only for higher levels of grain throughput, beyond approximately 600,000 tonnes per year in the 1990's and assuming that line related costs for the Churchill rail line will be borne by the federal government rather than by grain shippers (recognizing the broader role of the Port and the rail line in terms of national objectives such as defence, sovereignty and development in the North). Maintaining the Port and the railway line and not using it at or above such throughput levels is the worst option in terms of the economics of handling and transporting export grain.

2. There are net economic benefits to the Canadian economy for Churchill grain throughput levels of that magnitude or greater and for years of good, average and heavy ice conditions and under all three ocean freight rate scenarios, if the shipping season at the Port of Churchill is extended by one week in the spring and four weeks in the fall, creating a 17 week shipping

season from July 20 to November 15, inclusive. The economic analysis on which this conclusion is based assumes that all or most of the price advantage of Canadian export grain FOB Churchill versus FOB Thunder Bay (based on the marine freight rate spread between the two ports for shipments to Rotterdam) will be achieved by the Canadian export grain marketing program. While it is not possible to obtain hard data on grain selling prices FOB the two ports (owing to commercial confidentiality requirements of the Canadian Wheat Board) the study team concludes based on discussions with grain shippers and others that the above premise, while somewhat less valid in years of weak grain markets (a buyers' market), is likely to be valid in years of average grain markets and even more likely to be valid in years of strong grain markets (a sellers' market) such as those experienced in the late 1970's and early 1980's.

3. There are natural "break points" at the limits of the proposed extended season: a very minimal capital expenditure would be required to achieve the July 20-November 15 extended season; a more substantial expenditure of about $3.1 million would be required to achieve season extension beyond November 15, however, in order to dredge the harbour turning area to facilitate icebreaker operations within the harbour; the operating costs of season extension before July 20 and after November 15 would also be substantially higher because of the requirements of icebreaker escort en route, particularly in years of heavy ice conditions which tend to be experienced about one year in five.

4. To provide greater assurance that harbour operations could be maintained until November 15 without the need for occasional icebreaker operations within the harbour, the new tug should ideally be designed for operations in up to 30 cm of new, fast ice instead of up to 15 cm of fast ice and 30 cm of slush ice as it is now designed. The estimated cost of achieving this would be about $2 million, however, and it is unlikely that there would be time to produce the further-strengthened tug in time for summer, 1986 operations. Analyses presented early in sub-section 3.2.7 of the report indicate that the new tug, as currently designed, should be able to maintain operations up to November 15 in most years (about six out of seven) by operating continually as required in heavy ice years to keep fast ice from forming around the wharf and in the exit channel from the harbour. In the occasional year when this might not be possible, limited conventional icebreaker support within the

harbour would be called upon to clear the restricted area required for one or two vessels to leave the harbour during the last week of the season. Dredging of the turning area would not be required for such occasional icebreaker operations.

5. This suggests a strategy, therefore, in which the season would be extended as proposed and experience gained under the new extended season, before considering whether or not to strengthen the new tug further or to make further season extensions (e.g. to July 13 or July 6 in the spring and/or to November 22, November 29 or December 6 in the fall). The operating and cost experience obtained in the 17 week season would provide a much firmer basis than is now available regarding the feasibility of making the additional capital investments and experiencing the additional operating costs required for the longer season extension.

6. Operating experience (particularly in the larger throughput years of 1976 and 1977) and analysis of present operating capability indicate that the rail line, rail/elevator interface, elevator, elevator/vessel interface, and marine operation components of the Churchill grain delivery system have the capability to handle the throughput volumes examined in this study, both in the normal and the proposed extended season, with modest increased capital and operating costs as described in Chapter 7 of the report. This conclusion applies both to the existing delivery system and an improved rail system for operation during the 1990's, under any of the three options for rail improvement (boxcar rehabilitation, use of articulated hopper cars, or refurbishment of the line to carry conventional hopper cars).

7. The new insurance dates agreed to by the London underwriters and already observed by Canadian insurers, correspond to the season limits for marine navigation in the Canadian Arctic under Canada's Arctic Waters Pollution Prevention Act (AWPPA). Under these regulations, type E (unstrengthened) vessels are able to use the Port of Churchill for approximately 98 days per season, between about July 24 and about October 29. Type D vessels (the lowest classification of ice strengthened vessels) are able to use the Port for a season of about 118 days (from about July 12 until about November 6) and type C vessels for about 140 days (between about July 5 and about November 21).

8. There are two ways to address this situation: (1) declare the season open from July 20 to November 15 but only for operation of the various vessel types within the AWPPA limits; or (2) seek to change the AWPPA legislation to allow operation by vessel types E and D up to the limits of the new extended 17 week season but only under stringent conditions of provision of vessel information, use of ice advisors, and icebreaker escort for vessels operating outside of the AWPPA limits.

9. Our conclusion is that the first option is preferable, at least as a first step (e.g. operation of each vessel type within the AWPPA limits up to the limits of the proposed 17 week extended season). This is a logical first step which avoids the problems of a legislative change and an environmental assessment, and which is consistent with dates within which insurance will be available for vessels insured both by London underwriters and Canadian insurers.

10. The above conclusions are based on the premise that the Port of Churchill can and will be operated at viable levels of grain throughput and that appropriate funding and other arrangements would be forthcoming within an appropriate policy framework as discussed more fully in Study D.

11. The above conclusions are also drawn in the context of the findings of Study B (e.g. that there are no promising opportunities in sight regarding shipments of additional commodities through Churchill in significant quantities) and Study C (e.g. that an expanded resupply role for Churchill, both for marine and air resupply of Arctic communities, is economically viable and could lead to a doubling of the annual marine resupply shipments through Churchill, from about 16,000-25,000 tonnes per year to about 30-45,000 tonnes per year). If additional commodities were to become economically viable for shipment through the Port in future years (e.g. owing to the establishment of an aluminum smelter in Northern Manitoba, development of a new Arctic mine or oil production, etc.) the additional traffic would be expected to strengthen the conclusions stated above regarding the economic viability of extending the shipping season. Similarly, an extended shipping season would contribute to the ease of operations for expanded Arctic resupply through the Port, and operational conflicts between resupply and grain traffic are not anticipated for the recommended expanded resupply operations.

In summary, there is a good economic case to be made for expanding the existing 12 week shipping season of the Port of Churchill to 17 weeks, with subsequent consideration of possible further expansions based on the experience with the new expanded season. Minimal capital investments would be required to achieve the 17 week season and it is proposed that relevant vessel types would operate within the new season in accordance with AWPPA season limits for Class E and Class D vessels which are somewhat shorter than the 17 week season.

Proposed Action Plan

As noted in Point 10 of the Conclusions section above, the conclusions and recommendations presented here will apply only if there is an appropriate policy framework under which the Port of Churchill continues as a grain export port, at throughput levels which are high enough to be economic. Therefore, the first group of actions required in terms of season extension at the Port of Churchill must include the relevant policy decisions by the Government of Canada and discussions with the Canadian Wheat Board to establish an understanding regarding throughput levels to be used as targets by the CWB. In order to provide the CWB with marketing flexibility, any such targets would remain confidential and should probably be set on a multi-year basis; the policy statement by the Government of Canada would, of course, be public. The proposed action plan outlined below is based on the premise that export grain will consistently move through the Port at annual levels of about 600,000-700,000 tonnes per year or more.

Owing to the minimal physical and institutional requirements to achieve the proposed 17 week extended season, the action plan is relatively simple, as follows:

1. Representatives of the Government of Canada and the Government of Manitoba should continue discussions with London underwriters and representatives of the Canadian insurance industry in order to secure agreement as quickly as possible on new insurance arrangements for vessels using the Port of Churchill within the AWPPA season limits by type of vessel.

2. Arrangements should be made between Ports Canada and the Canadian Coast Guard for extended operation of the radio stations at Churchill and Frobisher Bay in order to serve the entire 17 week extended season and for standby icebreaker escort service for vessels en route between Churchill and Cape Chidley, in years where required by ice conditions.

3. In addition, arrangements should be made between these two agencies and other parties as appropriate to achieve the following in support of the extended season:

   - o establishment of an on-going monitoring program to provide year-by-year data on ice conditions in the harbour at Churchill, including ice conditions before freeze-over, date of freeze-over, ice thicknesses to the end of the new extended season and beyond, ice build-up on the dock face, and related weather conditions (it should be noted that this program, which was initiated in fall 1985 as recommended by the study team, can be carried out relatively easily by Ports Canada staff and therefore has little or no incremental cost);

   - o all vessels using Churchill in the extended season be required to report their positions twice daily to the Coast Guard, cooperate fully with the Ice Information Officer, and make use of the ice advisory service (based on aerial and satellite reconnaissance, ice forecasts, recommended shipping tracks and other relevant information) operated by the Atmospheric Environment Service and the Canadian Coast Guard; this procedure should also be required during the regular season;

   - o information services provided in the Port of Churchill be improved by providing access to ice charts, telephone contact with the Ice Information Officer to obtain routing advice and ice forecasts, and a formal mechanism for scheduling icebreaker escorts if required during an extended season. This service should also support coastal resupply operations out of the Port of Churchill;

   - o the regulations regarding the provision of icebreaker escort services should be determined and published by Transport Canada as should the rules to be followed by ships under escort both en route and in the harbour at Churchill;

- a process of monitoring and forecasting ice conditions be developed including two week forecasts of sufficient accuracy to enable icebreaker escort needs to be determined plus the appropriate scheduling of these services, and 4-6 week forecasts with sufficient accuracy to categorize the type of conditions to be expected as either good, moderate or heavy ice conditions;

- suitability of the land based navigational ranges at the Port of Churchill for operations within the harbour during the extended fall season be monitored and assessed, such that the improved land based radar beacons discussed in the report be installed if required; and

- arrangements for flying in skilled personnel and materials from established shipyards in Eastern Canada, as may be required from time to time to carry out vessel repairs that might be required in the Port of Churchill, be formalized.

Insurance underwriters should be made aware of these arrangements.

In addition to this, information links should be established between Ports Canada, the Canadian Coast Guard and the Canadian Wheat Board such that the Coast Guard and the Port are informed in advance of anticipated grain vessel arrivals off Cape Chidley and the Coast Guard is informed of the dates of anticipated vessel departures from the Port, in order that the Coast Guard can ensure that regular radio communications are maintained with vessels en route, that vessel captains are aware of support and advisory services, and that the Coast Guard is in a position to provide icebreaker escort if required.

Finally, as noted earlier, if the extended 17 week season is brought into effect, it is recommended that the operating and cost experience in the extended season be monitored by Ports Canada and other participants such that an assessment can be made subsequently regarding the possible cost-effectiveness of additional season extensions.

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